THE SPENCER AUTOMATIC WOOL FILLER SAVES OIL, LABOR Geo. S. Harwood & Son, SOLE SELLING AGENTS.

SPECIAL COTTON NUMBER.

Volume XIV. Number 4. APRIL, 1898. $2.00 Per Year, Including Directory. 20 Cents per Copy

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TEXTILE WORLD.

With which is Incorporated the

INDUSTRIAL RECORD

The Textile World's Complete Directory of the Mill Trade and of Large Buyers of Textile Fabrics, for 1898, is now in preparation. It will be issued next month, and will be presented to every paid-in-advance subscriber. It will be completely revised up to date, and contain about 400 pages, and 19 textile maps; several new features will be added.

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GUILD & LORD, Publishers, 620 Atlantic Avenue, Boston, Mass.

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PROVIDENCE, R. I.

Bleaching, Dyeing, Drying and Finishing Machinery.

Cotton, Paper and Husk Rolls.

TENTERING MACHINES

With Patent Self-Feeding Clips.

Patent Combination Rolls

—OF—

HUSK AND COTTON.

Calenders, Mangles, Drying Machines, Tentering Machines, Hydraulic Presses, Etc.

—BEETLES—

Short and Long Chain Dyeing, Sizing and Drying Machines.

PATENT

OIL, COMBINED "PLATE and FLAME"

SINGEING MACHINES.

H. W. BUTTERWORTH & SONS

COMPANY,

PHILADELPHIA, - PENN.

BLEACHING, PRINTING, DYEING,
DRYING and FINISHING MACHINERY.

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PATENT AUTOMATIC CLAMP,
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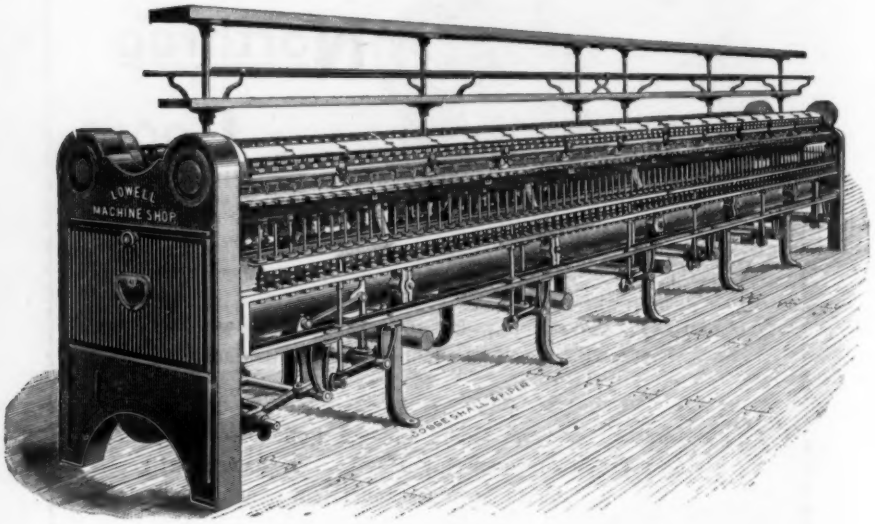
Calenders, Mangles, Drying Machines, Continuous Steaming Machines (Patented), Calender Rolls of Paper, Cotton, Patent Combination and Husk. Singeing Machines, using Coal, Gas and Oil Fuel.

SPECIAL.

Tentering Machines with Adjustable Cam (Patent applied for) giving a uniformly smooth vibrating motion and producing a superior finish.

THE LOWELL RING FRAME.



All parts are made on special tools to standard sizes and are interchangeable.

The greatest care is taken to have the frames constructed so as to obtain the greatest production with the highest speed.

All spindles are run in their bearings before being sent out.

Fluted Rolls are ground to accuracy as to their roundness and diameter, a very important characteristic for high speed.

We supply the best Separator in the market and provide all our frames with traveller clearers, lifting thread board device, cut gearing, improved roving traverse motion, heavy tin drums that don't break down, and all other parts that go with a first-class machine.

Lowell Machine Shop,

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Consideration

OF THE

Northrop . . Loom

Involves comparison with former similar innovations.

It is more expensive — yes, and so is the plain power loom more costly than the hand loom which it displaced.

Why not return to hand looms and get a cheap equipment also giving more laborers employment? The conservative should be more consistent.

Why do mills that have adopted our High Speed Spindles hesitate about using this loom? It will save them more than the entire cost of the spinning on which our spindles only gained a fraction.

If Revolving Flat Cards can be introduced in spite of their greater cost, our looms should follow or preceed them. We can show more profit to the user than the entire cost of Carding, including Drawing and Roving Machinery, with the Picker Room thrown in.

THESE ASSERTIONS ARE CAPABLE OF PROOF FROM THE RECORDS OF 20,000 LOOMS.

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Railway Heads,
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Reels,
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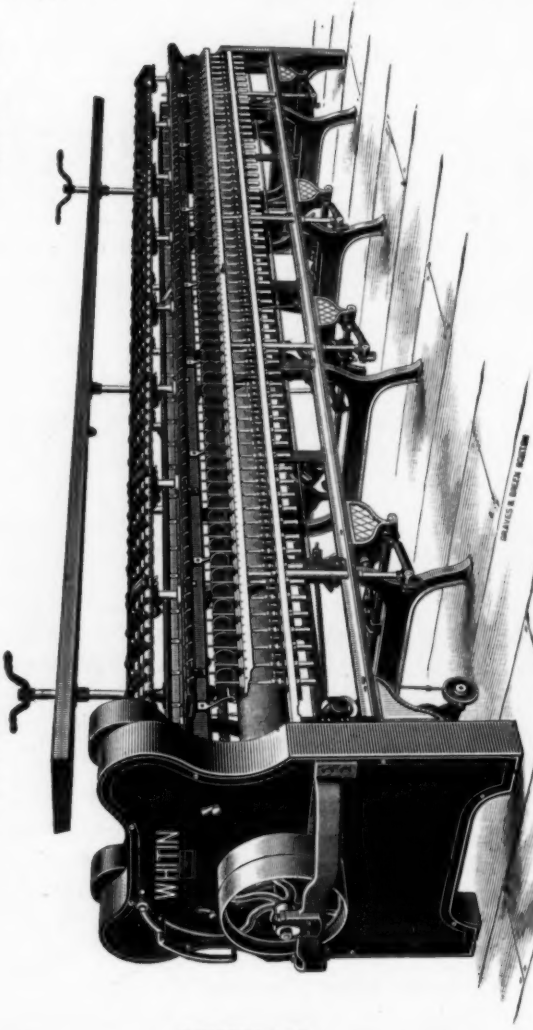

Revolving Flat Carding Engines,
Long Chain Quilling Machines,
Wet and Dry Twisters,
Looms,

The New Whitin Ring Spinning Frame.

BUILDERS OF

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Whitinsville, Mass.

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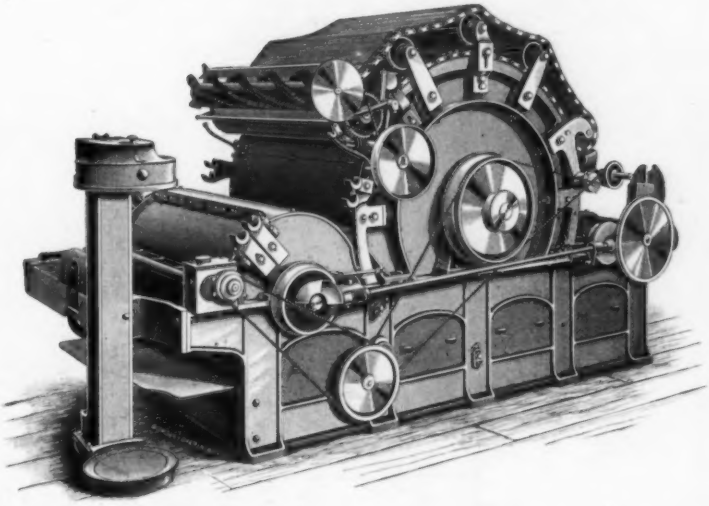
MASON MACHINE WORKS,

TAUNTON, MASS.

COTTON MACHINERY

NEW REVOLVING FLAT CARD.



Cards, Combers, Railway Heads, Drawing Frames, Spinning Frames, Mules and Looms,

INCLUDING THE

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SOUTHERN AGENCY:

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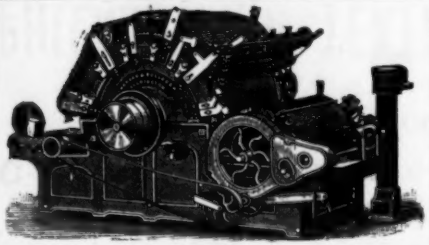

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The Simplest and Most Accurate. Greatest Production. Best Quality. Least Waste.

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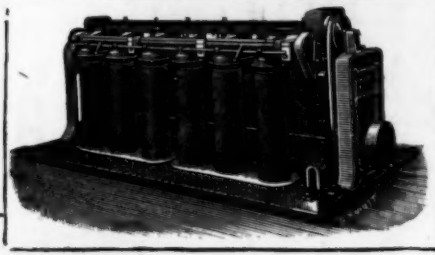
The quality of the sliver produced cannot be surpassed. Waste, "single" and roller laps are prevented, production increased, and great saving effected.



Bale Breakers, Feeders, Combined Self-Feeding Openers, Breaker and Finisher Lappers,

All made from entirely new patterns and containing many valuable patented improvements.

Slubbing, Intermediate, and Roving Machines.

New patented Differential motion, New Arrangement of Cone Drums, New System of Balancing top or bobbin rail, etc.

All parts of above machines are made by special tools and are exact duplicates.

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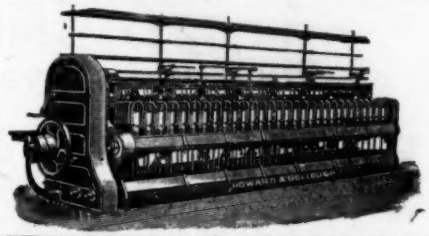

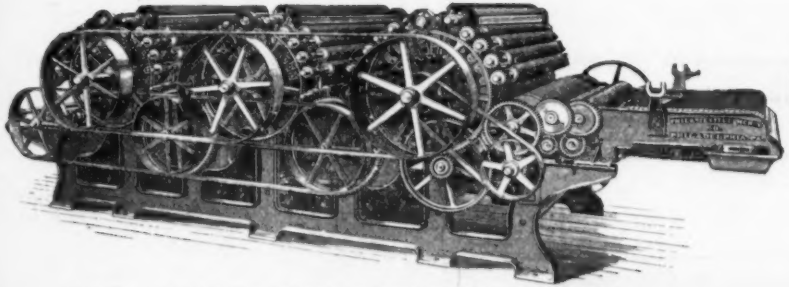

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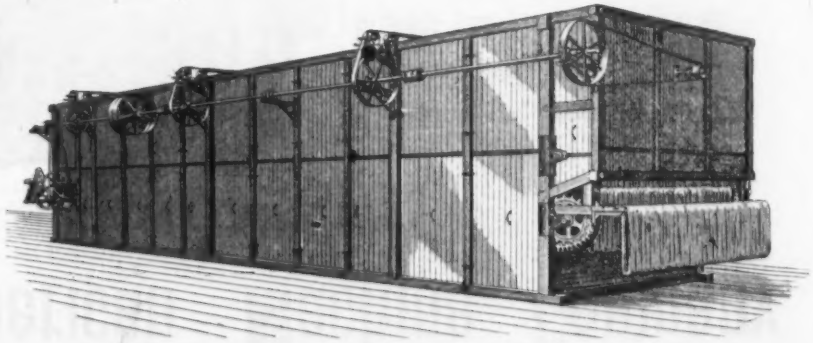

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on the market. It holds more stock, requires less space, and needs no "attachments."

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Spinners of Worsted Yarns. Mixes and Fast Colors Specialties.
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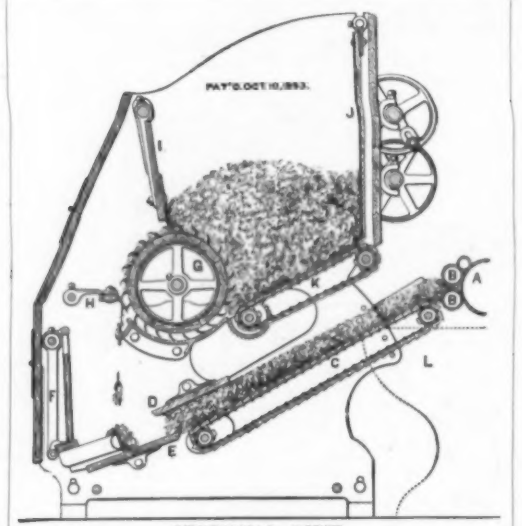
WOONSOCKET WORSTED MILLS,
EDWIN FARNELL, Agent.



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THE FISHER CARD FEED is simple in construction, is strongly built, turns out even work, requires little changing, and feeds the same whether full or nearly empty.

It is built in all sizes and guaranteed as represented.

STAR WORSTED COMPANY,
Worsted Yarns.

C. T. Crocker, Pres. C. B. Smith, Treas.

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Yours respectfully, STAR WORSTED COMPANY,
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"1894" pattern with Patent Flexible Bend with slots for direct setting of the flats to the cylinder by the gauge, and McConnell & Higginson's Patent Grinding Apparatus for grinding the flats from their working surfaces.
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Sole Manufacturers of
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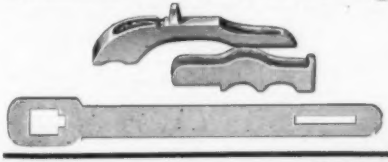

The weight can be taken off and put on to the middle rolls, without stopping your frames, when long staple cotton is used.
The Stirrup is always in place.
No bent stirrup resting on rolls
Manufacturers of all kinds of Saddles, Stirrups and Levers. Send for Samples and Prices.
Spinners' Supplies in general.

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Patent Bobbin and Cop Winders, Spoolers, Beamers, Warp Mills, Chenille Cutting, Carpet Rolling Machines, Reels, Etc.
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THE LATEST AND BEST LOOMS AND HARNESS MOTIONS

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BODY—Vulcanized Fibre. **SIDE SEAM**—Riveted with Patent Clinched Rivets. **RINGS**—Tinned Steel, Brazed Joints, Curled Edges. **BOTTOM**—IXXX. Tin Star Corrugation: Fastened without the use of nails or screws, will not crack, warp or shrink and cannot come out. **FINISH**—Coated inside and out with moisture proof coating, handsome and smooth. **WEIGHT**—About one half pound per inch diameter. **SIZE**—All cans to an exact size, perfectly round and true. **DURABILITY**—Superior to any other Can.

Also Manufacturers of Hill's Improved IXXX Tin and Galvanized Iron Roving Cans.

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WHITINSVILLE, MASS. U.S.A.
OUR PATENTED SPECIALTIES
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WOOL WASHING,

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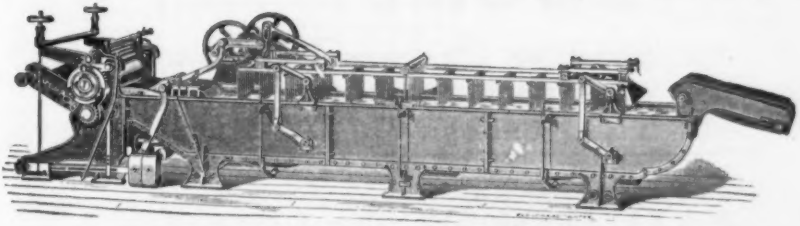
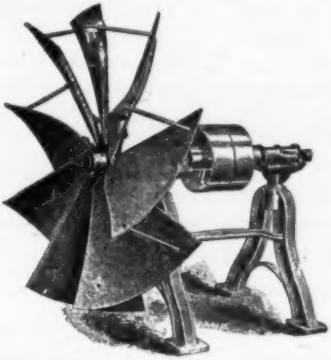


NEW PARALLEL RAKE WOOL WASHER.

In addition to the above, we are the only builders of **Four Rake and Hydraulic Washers.** We guarantee our machines to be the **Lightest Running** and to require the **Least Repair** of any on the market. **Production and results are second to none.**



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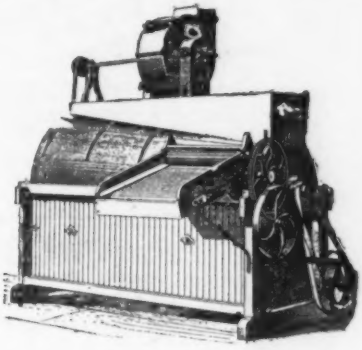

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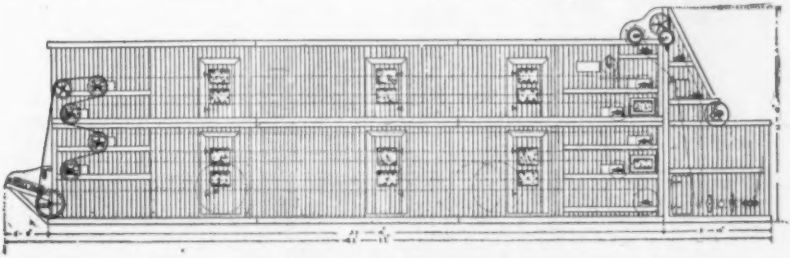
Exterior View Right-Hand Machine with Fan.



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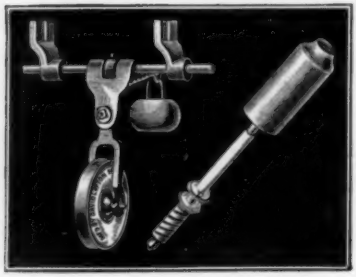

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Quality and workmanship guaranteed

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We can furnish more than 100 different patterns of the common tail or stick picker used on cotton looms, at prices varying from 18 to 90 cents per pound, according to quality. We also make Loop Pickers for Northrop looms to fit any stick, and furnish these also in different grades at different prices. We offer the benefit of more than 30 years experience in the manufacture of loom pickers and confidently believe that our work is as good and our prices as low as it is possible to make them.

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Flyers Repaired and Fitted with any desired style of Pressers, Spindles Straighten Restepped and Retopped.

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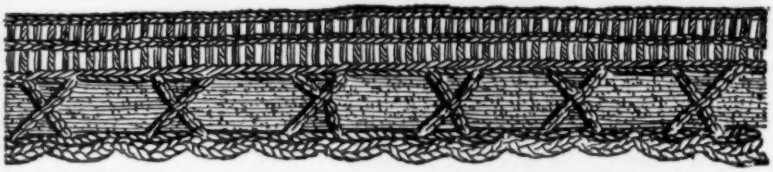

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EDGINGS AND BRAIDS SUPERIOR

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Weekly Output Increased to 2,500,000 Yards.

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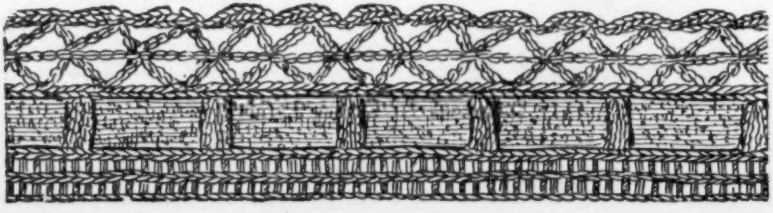

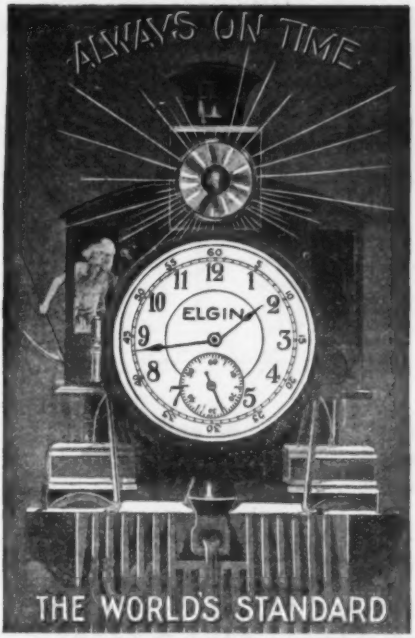

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Through all that incessant pounding over the rails in locomotive cabs, with their swing and sway and extremes of heat and cold, the

FULL RUBY JEWELED ELGIN

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An **Elgin Watch** always has the word "**Elgin**" engraved on the works—fully guaranteed.

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Special Machines for Cotton Mills, Woolen Mills, Print Works, Bleacheries, etc.

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Loopers, Needles, Threads, etc.

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SKANEATELES, N. Y.

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High Grades a specialty.

Sample Orders Solicited.

Hahn's Latest Improved **Watchman's Time Detector.**

This clock is adapted to six or twelve stations and the keys are all different. A liberal allowance made for old detectors. For circulars, prices and further information address,

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Harness Varnish

For JACQUARD LOOMS.

$1.50 per gallon. $1.40 per gallon in 5 gallon cans. Cans extra.

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DEALER IN

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Agents for Wm. White Wool Scouring Machines and Atlas Burr Pickers.

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The Short Line between
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Latest French novelties in sketches for Printed Cotton Goods, Printed Silk, Broad Silks and all kinds of textile fabrics.

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For Cotton and Gingham Mills, Bleacheries, Print Works, Etc.

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All Work Guaranteed. 157 Orange St., Providence, R. I.

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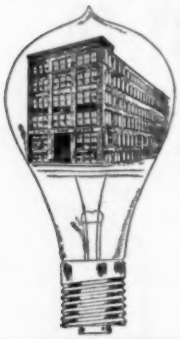

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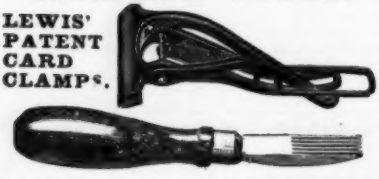

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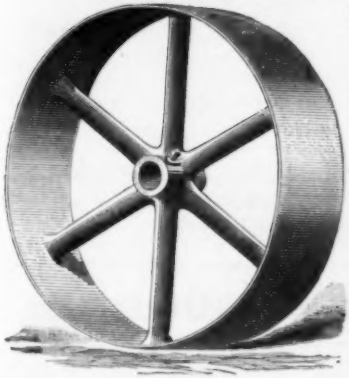

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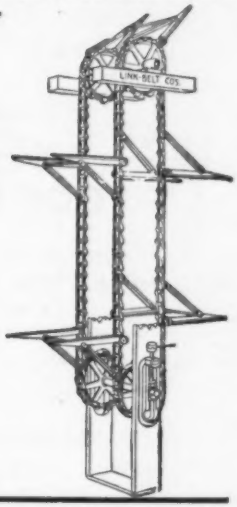

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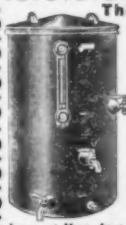

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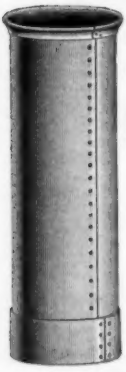

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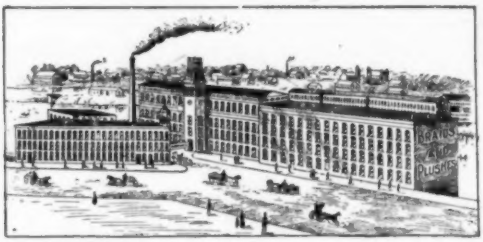

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George W. Gregory, in November, 1874, resigned his position as Principal Examiner U. Patent Office to enter the firm.

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List of Textile Patents.

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Specifications and drawings furnished for ten cents each. Address W. S. Gavey, P. O. Box 222, Brooklyn, N. Y.

Calendering Machine. 600,518. Peter Dillon, Lawrence, Mass., assignor of one-half to Henry C. King, Lawrence, Mass.

Calendering Machine. 600,519. Peter Dillon, Lawrence, Mass., assignor of one-half to Henry C. King, Lawrence, Mass

Cloth Clip. 600,184. William R. Tillinghast, Providence, R. I.

Cotton Cleaning Mechanism. Seed. 599,575. Magnus Swenson, Chicago, Ill., assignor to the American Cotton Company, New York, N. Y.

Cotton Gin. 600,287. Thomas B. Lee, Barnwell S. C.

Knitted Fabrics. 599,438. Winslow M. Bell, New York, N. Y.

Knitting Machine, Straight Bar. 599,435. John A. A. Barfoot and Josiah Johnson, Leicester, England.

Loom. 600,121. Randolph Crompton and Horace Wyman, Worcester, Mass., assignors to the Crompton & Knowles Loom Works, Worcester, Mass. and Providence, R. I.

Loom. 600,016. James H. Northrop, Hopedale, Mass., assignor to the Draper Company, Portland, Me. and Hopedale, Mass.

Loom. 600,053. Horace Wyman and Charles Crompton, Worcester, Mass., assignors to the Crompton Loom Works, Worcester, Mass.

Loom. 600,488. Randolph Crompton and Horace Wyman, Worcester, Mass., assignors to the Crompton & Knowles Loom Works, Worcester, Mass. and Providence, R. I.

Loom. 600,489. Randolph Crompton and Horace Wyman, Worcester, Mass., assignors to the Crompton & Knowles Loom Works, Worcester, Mass. and Providence, R. I.

Loom. 600,490. Randolph Crompton and Horace Wyman, Worcester Mass., assignors to the Crompton & Knowles Loom Works, Worcester, Mass. and Providence, R. I.

Loom. 600,216. Henry Eastwood, Lake View, N. J., assignor by mesne assignments to the Eastwood & White Company, Lake View, N. J.

Loom. 600,836. Charles A. Littlefield, Lowell, Mass., assignor to the Draper Company, Portland, Me. and Hopedale, Mass.

Loom Harness. 600,669. Millard F. Field, Boston, Mass., assignor to John Clarke, trustee, Boston, Mass.

Loom Harness, Leveling Device. 599,675. Horace Wyman, Worcester, Mass., assignor to the Crompton & Knowles Loom Works, Worcester, Mass

Loom Heddle. 599,836. William Fehr, Philadelphia, Pa.

Looms, Jacquard Machine for. 600,807. Samuel Sheldon, Paterson, N. J.

Looms, Picking Mechanism for. 599,676. Albert Ainley, Plymouth, Mass., assignor of one-half to H. Earl Mabbett, Plymouth, Mass.

Loom Reeds, Tool for Fixing. 600,504. Leanderi Autio, Fitchburg, Mass

Loom Shuttles, Tension Device for. 600,520. John J. Donovan, Lowell, Mass.

Looms, Self-Threading Shuttle for. 599,860. Joseph H. Nason, Somerville, Mass., assignor of one half to Henry M. Hewes, Boston, Mass.

Looms, Warp Strap-Motion for. 599,832. Charles Crompton, Worcester, Mass., assignor to the Crompton & Knowles Loom Company, Worcester, Mass.

Looms, Warp Stop-Motion for. 600,008. Charles A. Littlefield, Lowell, Mass., assignor to the Draper Company, Portland, Me. and Hopedale, Mass.

Printing Machine, Fabric. 599,948 Samuel H. Sharp, Leeds, England.

Spindle. 600,634. Ferdinand Coirin, Paterson, N. J.

Spindle. 600,786. Henry E. Hughes, Pawtucket, R. I., assignor of one half to the Easton & Burnham Machine Company, Pawtucket, R. I.

Spinning Machine, Ring. 599,539. Michael E. Sullivan, New Bedford, Mass., as-

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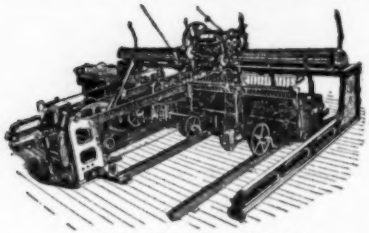

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The small cut shown herewith does not give an adequate representation of the best woolen mule on the market today. The illustration in our catalogue (which may be had for the asking) gives a much better idea, and also the details and specifications. We can only outline a few features of special value here.

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Spinning Machines, Roving Guide for. 600,256. Isaac H. Russell, Fall River, Mass.

Spinning Machines, Thread-Guide Support for. 600,341. Edward Whittum, Fall River, Mass.

Spinning Mule. 599,813. Joseph Venables, Bennington, Vt.

Warp Drawing-in Machine. 600,670. Millard F. Field, Boston, Mass., assignor to John Clarke, trustee, Boston, Mass.

Winding Machine, Cop. 599,488. Dickerson G. Baker, Willimantic, Conn.

Wool, etc., Drying Machine for. 600,885. Charles W. Schwartz, Jr., Philadelphia, Pa., assignor to the Philadelphia Textile Machinery Company, Philadelphia, Pa.

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SIR BENJAMIN A. DOBSON.

TEXTILE WORLD.

Vol. XIV. APRIL, 1898. No. 4.

SIR BENJAMIN A. DOBSON.

Every user of cotton machinery, wherever cotton mills exist, will lament the death of Sir Benjamin A. Dobson, which occurred on March 4, at his home in Bolton.

He was a man who endeared himself to all his acquaintances by his genial disposition and straightforward character, and one who commanded their highest respect for his unusual breadth of general knowledge, and his technical attainments in his own particular line of work. This work, it is almost needless to say, was the manufacture of machinery for treating the cotton fibre in all its stages, from the cotton field to its final disposition in the form of finished yarn, a truly wide field when considered in all its bearings.

Sir Benjamin Dobson, primarily qualified as an expert in machine building, was also a very keen observerer. He had traveled through every country where the cotton fibre is known, and his knowledge was accordingly very broad. He was thus enabled to apply to the machinery the results of his observations to the fullest extent, to the end that the machinery turned out by the firm of Dobson & Barlow, Limited, has always held the enviable position of being unexcelled.

Sir Benjamin was born fifty-one years ago on the Isle of Man, and his early education was so moulded as to qualify him as a mechanical engineer. He soon showed his ability, and ere long became manager of construction on one of the Irish railways. This position he held for several years, and to his early acquaintance with the Irish character he was doubtless indebted, in a great measure, for his ready wit, which was a very marked characteristic.

His uncle, Benjamin Dobson, was at this time the surviving partner of the firm of Dobson & Barlow. Being anxious to preserve the name, and the continuity of the firm, which, founded in 1790, had the distinction of being the oldest of its kind in the world; and he, himself being without children, and in failing health, the opportunity was given to the late Sir Benjamin to take an active part in its future welfare. Accordingly, together with his surviving partner, T. H. Rushton, he entered its employ as apprentice, and these two together followed the lathe, the planer, and the various practical processes of machine making until they were qualified to accept the management of the concern, which they did in 1875 as copartners, the senior Benjamin Dobson retiring. Since that time Sir Benjamin devoted himself with untiring energy to the work of practical organization, Mr. Rushton taking charge of the financial affairs of the firm.

Sir Benjamin realized that one great element of success was to be in actual touch with the requirements of cotton spinning in the various parts of the world. He accordingly spent a large portion of each year in traveling, and he thus became as familiar with the needs of the trade in Russia, France, China, India, Spain, Japan, and the United States, as he was with its requirements in his own country. He made many visits to these countries and being a good linguist, and a keen observer, absorbed a fund of information and anecdote which was ever a source of pleasure and profit to his friends.

The works at Bolton, accordingly, soon began to outgrow their quarters, and from time to time, additions had to

be made until in 1890 the business had become so large as to be unwieldy to conduct as a co-partnership. A limited company was at this time formed which has since continued under the same management.

Sir Benjamin was a member of the Royal Society of Mechanical Engineers and also Chevalier de La Legion D'Honneur.

He published a number of standard works connected with cotton manufacturing, among which may be mentioned "The Principles of Carding Cotton," "The Manufacturing of Card Wire and the Grinding of Cards," "Some Difficulties in Cotton Spinning," "Humidity in Cotton Mills," and many other shorter papers.

He was one of those men who did not allow his business affairs to absorb his entire time and energy, and he thus devoted a great deal of attention to the study of various educational and other matters of public welfare. To his untiring efforts is the existence of the fine textile school at Bolton greatly indebted. He served several terms as public magistrate and town councillor in the city of Bolton. About four years ago he was elected mayor of the city, and managed to find time in some way or other, in spite of his business cares and foreign travels, to conduct this office in such a manner as to win the unanimous support of all citizens, regardless of party ties. He was thrice re-elected, really against his personal inclinations, and was at his death serving in this capacity. In politics he was a strong Concervative.

Military affairs alco commanded much of the time and attention, and he served in the volunteers, being promoted from time to time until he was appointed lieutenant-colonel some two years ago.

At the time of the recent Jubliee celebration his public and private work was recognized by Her Majesty, the Queen, who conferred a well deserved title upon him.

Early in the 70's he was married to Lady Dobson, who, with nine children, survives him.

His death is a real loss to the entire cotton manufacturing industry, and equally so to his countrymen, generally, who, had on more than one occasion singled him out to represent them in Parliament. This distinction he felt forced to decline, but without doubt, had he lived, he would have ere long taken a seat in theHouse of Commons. As a man of the highest integrity of character, straightforward bearing, and ever genial disposition his loss will be mourned by a host of friends.

As it is almost impossible to separate the life and career of a man from the business with which he is connected and in the prosecution of which he is an important factor, it may be of interest to give some idea of the magnitude of the works of Dobson & Barlow, Ltd. The ground covered by these works is over 30,000 square yards. They are replete with the very latest machinery and contrivances for the successful undertaking of the particular demand that the principals set themselves out to meet. They are a model of textile engineering works, and nothing that skill or science can suggest as conducive to efficiency is wanting. The work produced by them includes every machine used in the manipulation of cotton, from the breaking up of the raw material to the finished thread and its subsequent doubling, winding, reeling, gassing, and polishing. The firm also makes all descriptions of machinery for the preparation, spinning, and doubling of cotton waste, wool, worsted, silk, and vigonia yarns. The production consists of nearly a million spindles and the necessary preparing machinery per annum. Substantially, this means the complete equipment every month of a mill containing 80,000 spindles, which, when it is considered that everything is of the highest attainable finish and workmanship, is a matter to be very proud of. The firm's operations extend to all parts of the world where textile manufactures are carried on—India, China, Japan, and other parts of the remoter East, to say nothing of the Continent of Europe and the United States of America. No less than 600 packing cases leave the packing shop every week.

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Jobbers and Large Retailers,
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Special quarterly issues are published in January, April, July and October; one (January) being a statistical issue, and the others devoted especially to the cotton, knitting and woolen branches, respectively.

NEW ENGLAND TEXTILE INDUSTRIES.

We are in receipt of the reports of the bureaus of labor statistics of the State of Maine and the State of North Carolina, for the year 1897. None of these reports possesses the value to the student of statistics as those emanating from the Bureau of Labor Statistics of Massachusetts. Apparently, there is not that care exercised as in the latter State.

The Maine report accounts for sixteen cotton mills in the State, with a spindle capacity of 869,437, giving an average of 54,339 spindles per mill. This number of spindles, however, is at least 30,000 short of the actual number for 1897. Two mills, with 15,000 spindles, are entirely omitted. The number of woolen mills in the State is given as 51, 48 of which are reported as having 347 sets of cards. Two mills are devoted to weaving only. Important omissions are noted of mills that do combing, and no record is made of 16 combing machines that were in operation in 1897. The average number of sets in the woolen mills is 7.23 per mill. The statistical records of the mills in Maine show that there is an increasing tendency on the part of managers, of both the cotton and woolen establishments, to employ less child labor, and the factory inspector of the State reports that very few children in any of the factories and workshops of the State are employed contrary to law. There is scarcely an instance of the employer engaging the services of a child under the age of 16 years, unless there has been an affidavit made by the parent or guardian and an entry of the name, age and address of the child made in a register kept for the purpose, and another entry in a list posted on the wall of the room in which the child works. It appears, however, that an affidavit is refused to be taken from any parent for a child under the average weight of school children 14 years of age, which is 80 pounds; and all children are expected to be able to read and write simple sentences in the English language.

In the Maine cotton industry, it appears that for the year under consideration, 58 per cent. of the value of the product of the mills reporting, represented the cost of the raw material; 33 per cent., wages; and nine per cent., a margin for interest on capital, wear and tear of machinery, taxes, insurance, salaries, waste, profits, etc. Compared with the percentages for the census years of 1880 and 1890, these late statistics show an increase in the percentage of the value of product devoted to wages. The wage percentage in 1880 was 22, and in 1890, 28.5, against 33 as given for 1897. In the woolen industry of the State, the percentage of wages in the value of the product was 15.6 in 1880, 21.7 in 1890, and 25.1 in 1896-97. These figures are interesting as showing the increasing proportion of the cost of labor in the value of the completed article. They show what is existing elsewhere in all branches of the manufacturing industries, that labor is getting more and more of the value of the goods made.

The relative position of the market value of cotton goods and the rate of wages for a period of years, may be better appreciated by a study of the following statistics, which may be depended upon as approximately correct.

Price Standard Sheetings:

1870	$14.58
1880	8.51
1890	7.00
1896	5.45

Rate of Wages.

1870	100%
1880	75%
1890	72%
1896	88%

Decline in Wages.

1870 to 1896	12.0%

Increase in Wages.

1880 to 1896	17.3%

Decline in Goods.

1870 to 1896	63.0%
1880 to 1896	36.0%
Increase in net earnings of help, due to improved machinery, etc	25%

By these it will be seen that while there was a decline in wages of twelve per cent. between 1870 and 1896, there was a decline in the value of goods within this period of 63 per cent. The wages in 1896, as compared with those in 1880, show an increase. The price of goods, however, has declined without a break since 1870. As will be seen, we have called the rate of wages for 1870, 100 per cent., that being taken as the standard of comparison. Notwithstanding the slight decline in wages between 1870 and 1896, the net earnings of factory help have improved 25 per cent. These people are that much better off. If we had the statistics bearing upon the conditions existing in 1897, and up to the present time, some modifications would have to be made in the foregoing figures.

According to the North Carolina report, the number of cotton mills given in that State is 207, with 1,044,385 spindles. This report we had occasion to refer to in a previous issue, taken from certain advance sheets of it. In this number of mills are included 25 hosiery mills with 1410 knitting machines, and two dyeing and finishing establishments. Notwithstanding the hours of labor at which the mills are supposed to have been in operation, averaging 66 hours a week, the fact was, the number of working hours was only 48 per week during 1897.

We give below some interesting statistics relating to the cotton industries of Maine and North Carolina, in regard to the employment of men, women and children.

AVERAGE NUMBER COTTON MILL HANDS EMPLOYED.

	Percentages		
	Men.	Women.	Children.
Maine	42	53	5
North Carolina	33	46	21

The employment of operatives in the woolen mills of Maine shows an average of 66 per cent. men, 33 per cent. women, and one per cent. children. The average yearly earnings for 1897, among Maine cotton mill operatives was $289.50, and among woolen mill operatives, $348.80.

COTTON FUTURES.

The dealing in cotton future contracts, as practiced by the several cotton exchanges in this country, notably those at New York and New Orleans, has been the subject of much com-

ment and discussion in Congress and in the press, as to its affect upon the morals of trade and of those operating in them. There is no doubt that, if improperly conducted, as purely a matter of speculation, it is demoralizing to the interests of all concerned. In this aspect of it, the laws are sufficiently drastic to prohibit it, or to impose sufficiently severe penalties to make it unprofitable as a means of attaining wealth. The highest courts of the land have passed opinions upon the legality of such contracts as are recognized at the cotton exchanges, by invariably, we believe, deciding that they are perfectly legal, except where it appears that they are used for gambling purposes or betting upon differences in the market value of cotton.

The question of the validity of cotton future contracts has recently been prominently brought into view by the recent decision of Judge Emory Speer, of the United States Circuit Court in Georgia, in a case where losses were incurred on the part of one who speculated in these contracts, admittedly for gambling purposes. As the decision of Judge Speer, which first was misinterpreted in the brief account of it that appeared in the public press, is a matter in which our readers are necessarily more or less interested, we wrote to the Judge for the substance of his decision, and he very kindly sent it to us in full. We find, that instead of ruling in opposition to the decision of the Supreme Court of the United States, as was first intimated, his opinion is in perfect harmony with it; and that the case in question was simply, in effect, that the parties involved were engaged in a game of chance, which, of course, could have no standing in court. The notable facts in the case were that the defendant, or the one losing in the operations, against whom the suit was brought for the recovery of the losses incurred, employed a certain firm of brokers to make contracts for the future delivery of cotton in New York, with the intention, well known to both principal and broker, of realizing upon the differences in value arising under the contract, in the New York market, prior to the stipulated time for the delivery of the contract cotton. It was clearly shown that the principal never intended to deliver or receive cotton under the contract, but relied upon his agents to avoid this contingency, but simply to realize upon the differences in value, and his agents so arranged his business and carried out this intention.

With these facts before the court, it could do nothing but render a decision to the effect that all such operations in future contracts, though under cover of legal forms, was nothing more than a species of gambling, which the laws of the country do not and cannot recognize, as contrary to public morals. This decision is one of several, which should be carefully borne in the mind of those who pass their time and spend their money in operating in future contracts, with a clearly defined intention of never receiving nor delivering cotton, but taking chances in the differences of values.

To give some idea of the amount of cotton sold on future contracts in the New York and New Orleans cotton exchanges, compared with the total American crop, we will state, for examples, that during the season of 1880-81, 38 million bales were sold in those two exchanges, against a crop of 6,600,000 bales; for the season of 1885-86, 34 million bales were thus sold, against a crop of 6,600,000 bales; for 1890-91, 39 million bales were thus sold, against a crop of 8,700,000 bales; and for 1895-96, 72 million bales were thus sold, against a crop of 7,200,000 bales. How many of these contract sales were for gambling purposes it is impossible to know, as it would be necessary, in order to prove such purposes, that an understanding of this kind existed between the principal and his agent, or between the buyer and the seller. This should be clearly borne in mind that the purchase or sale of cotton on a future contract, in order to bring it within the scope of a gambling operation, must be proved that such was the understanding of

both parties. In the well known case of Bibb vs. Allen, the decision of the United States Supreme Court is quoted in opposition to that of Judge Speer, but upon examination they are found to be reciprocally supporting, though based upon different facts or proven intentions. The Judge, in this quoted case, arrived at the obvious and inevitable conclusion that while a contract, made in good faith for the future actual delivery of the cotton itself, is enforcible, yet, however ingenious may be the device to avoid the law, whenever it appears that the transaction in "futures," is made merely to speculate in differences on the rise and fall of the market prices, and this is known to both parties, the policy of the law commands that assistance be withheld from either party.

Operations in future contracts are not infrequently undertaken by cotton manufacturers, and in a perfectly legitimate way, in which they do not intend to receive the actual cotton on the contract, but use the system of thus dealing as a cover to protect themselves against loss in the manufacture of goods for future delivery, for which they will require a future supply of the raw material. This legitimate use of the contract in vogue at our cotton exchanges, was clearly set forth in its legitimate phase in an article that appeared in our last December issue, based upon the case that was tried in the United States Circuit Court in South Carolina, in which the well known commission house of O. H. Sampson & Company figured as plaintiff for the recovery of money that was advanced for such purpose, on account of a mill in which it was interested. The court decided in favor of Sampson, as it was shown that the delivery of some kind of cotton was contemplated, and that the purchase of cotton under the future contract was simply prudential, as a protection against possible loss arising from a rise in the price of the commodity.

A case has recently been decided in Manchester, England, regarding the legal aspects of dealing in future contracts as pursued according to the rules of the Liverpool Cotton Association. The opinion of the court, in that case, was based on the principle that if the intentions of the parties interested were simply to trade upon differences as a protection from loss in the future purchase of a particular grade of cotton, the transactions between them were perfectly legitimate, otherwise, they were nothing more or less than gambling, and therefore invalid. The English courts of justice thus apparently agree exactly with the law and equity as defined by Judge Speer in his recent decision, which we think will be regarded as perfectly sound in every respect.

TEXTILE SCHOOLS.

Technical education in the textile arts is a matter that seems to be agitating several sections of the country, where there are textile manufacturing communities. An effort, even, is being made about Louisville, Ky., for the establishment of a textile school, to give instruction to those interested in the industry in that section. The plans for such a school are in the hands of the Commercial Club of that city. The spirit that promotes such a movement is certainly commendable.

The South has taken hold of the matter with a good deal of earnestness, and the prospects are quite favorable for the establishment of textile schools in Georgia and South Carolina. The one that has been suggested for Atlanta has not yet obtained the necessary funds for its promotion, but with the $10,000 that have been promised to the enterprise by the Georgia Legislature, the prospects are unusually propitious for an additional sum of the same amount being subscribed by the friends of such a school, which, when accomplished, will give the project a substantial and practical start. Instead of individual subscriptions to such a school, of $100, as given by a so-called millionaire of Pennsylvania, who seems to be very much interested in the scheme, individual subscriptions of $500 to $1000 should be made by the wealthy man-

ufacturers and public spirited citizens of that State, as the establishment of such a school is quite as much to their interests, as it is to the general industrial progress of that Commonwealth. Many of the leading manufacturers of the South, however, are not kindly disposed to the scheme of establishing textile schools in that section, at the present time, believing that there should be more concentration of manufacturing interests before anything of the kind is undertaken.

The movement to locate a textile school at Clemson, S. C., seems near to fruition as already the trustees of the college that is located at that point have appropriated $12,500 for such a school, with the intention of going right ahead in seeking outside aid and contributions of machinery from machine builders. We do not understand that the school will be inaugurated until a larger amount than the above is secured. We hardly think it would be regarded, by those familiar with the necessities of such a school, as a sufficient sum upon which to start so important an undertaking. Whatever is done in this direction in the South, it will require outside aid to support the institutions there, as well as those at Philadelphia and Lowell. Clemson has the advantage of occupying a peculiarly favorable location as a geographical centre of the manufacturing communities of the Piedmont region.

AMERICAN WOOLENS.

In the late annual report of Secretary North to the National Association of Wool Manufacturers, attention was called to the fact that the quality of domestic production has been steadily improving. This is due, we think, without doubt, to the ability of woolen manufacturers obtaining a wider and more suitable selection of raw material in the open markets of the world, from 1894 to 1897. The restrictions that are now placed on manufacturers, in the procuring of their wool is showing itself in a reduction in the quality of their products by the use of much increased quantities of wool substitutes, such as shoddy, cotton, etc., a fact that is noted in all recent market reports. Restrictions that are placed upon the obtaining of the pure stock that should enter into our woolen manufactures have the unavoidable tendency of forcing our manufacturers upon lower grade goods. There is a needed improvement in the wool manufacturing industry in the greater diversity of the character of goods made. This is being slowly brought about, notwithstanding the almost prohibitive laws compelling our manufacturers to confine their wants in the way of raw material to a certain growth of wool, which, however valuable it may be in the requisite qualities of strength and elasticity, lack many characteristics that are essential in the manufacture of novelties, etc., such as are made abroad, and which have to be imported to supply the demand that will always exist for them.

INSURANCE ON COTTON.

The Lloyd's have sent to this country an expert representing a number of English marine insurance companies, for the purpose of examining into the causes of, and to suggest remedies for, the losses on cotton shipments. This matter has been referred to, not only in these columns, but in other publications, for the last year, without any apparently material benefit arising from the discussions and efforts to bring about suitable remedial methods. There is undoubtedly a vast amount of carelessness on the part of transportation companies, and others, in the handling of American cotton bales; and there is gross negligence of some character to which the many fires on ship-board, originating in the cotton cargo, are attributable. The greatest amount of damage, however, is in allowing the cotton to be exposed to the ravages of the weather, at all stages, from the plantation to the port of destination, or until it is placed on shipboard for export. We think, however, that many of the

complaints that are lodged against the planters and railroad companies might be justly made against mill owners who pile their surplus coton in their mill yards, covered by a few boards on top, exposing the pile to the weather, to the inevitable damage of the staple. A case of this kind was witnessed quite recently by us in one of the yards of a large mill corporation in Massachusetts. The price of cotton is so extremely low at the present time that there is no great inducement to resort to any extra care for its protection against the weather or pilfering.

ENGLISH TEXTILE MACHINERY.

The amount of English textile machinery that was imported into this country for 1897 was less than one-half of the value of the imports for either 1895 or 1896. On the other hand, Japan was a large buyer of English textile machinery in 1897, as compared with 1896, and particularly with 1895. Already, complaints are coming from Japan of an undue increase in the amount of cotton machinery, resulting in an over production and a depression in cotton manufacturing in that country. Whether this condition of manufacturing will effect a curtailment there, till the demand equals more nearly the production, is a matter that will have to await development. The engineering strike that existed in the industries of England, in 1897, seriously affected the output of all machinery, and especially that relating to the textile trades. The execution of orders for the United States and other countries were delayed, in a number of instances, from six to eight months. This is noticed in the fact that the textile machinery exports from Great Britain were less by five million dollars than in 1896, and $2,200,000 less than in 1895.

--Our recent advices from Continental Europe impress us still more of the necessity of abolishing the abominable system of consigning goods, by means of which our revenues are robbed and our manufactures seriously affected. There are a number of manufacturing establishements, in Germany, for instance, that consign their products to themselves or agents in New York, Boston, Baltimore or Chicago, at prices away down under the market value. Competition against such methods is absolutely impossible. If we were so inclined, we could furnish the names of parties that are doing this sort of business. The result is, as has long been known, that honest American dealers cannot buy of foreign sources to as good advantage as they can of these agents in New York and elsewhere. Whether a remedy can be suggested and carried out is something that we are not in a position to assert, but it is well worth the effort to uproot this system that is so baneful to our manufactures.

Perhaps the country, as a whole, never enjoyed so much the elements of prosperity as what has existed within the last twelve months, due principally to the unusual yield of cereals and agricultural products that enter into our export trade, and which have been in urgent demand for consumption abroad. The principal cereal crop upon which we depend for export returns is the wheat crop, which for 1897 was the largest ever grown in this country, and which has brought to the farmer an average price of 80.8 cents per bushel, against 72.6 cents for the 1896 crop, and 49.1 cents for the 1894 crop. In consequence, the farmers have been placed in excellent financial circumstances, which will be realized more fully as time progresses. It is already being felt in the West. Notwithstanding the low prices for the cotton crop this year, the evidences are that the planters have done financially well.

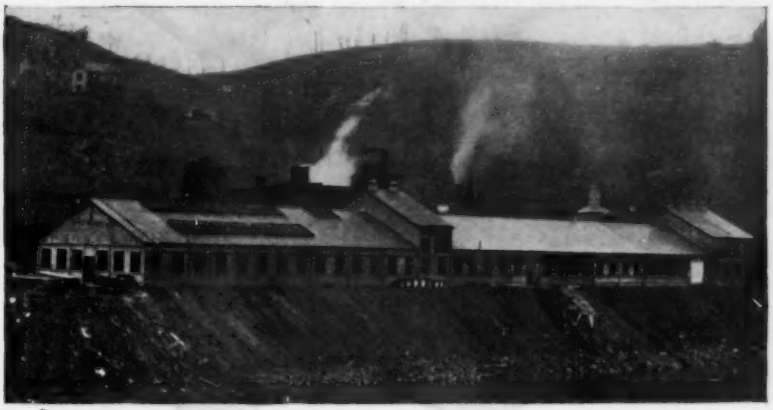
--It would be much to the credit of the city of Lowell if it would contribute something handsomely to the support of the textile school that is established in its midst, but the State owes it to itself to see that the school shall not suffer in consequence or be without proper pecuniary support, even if it has to bear the whole of the burden, without regard to any short sightedness on the part of Lowell.

Concrete and Steel in Fire Proof Construction.

That concrete and steel, used in combination, will be the principle materials used in fire proof construction in a majority of our future buildings, was clearly and practically demonstrated in a lecture given before the Engineers' Club of Philadelphia by a prominent engineer of New York, a short time ago.

A series of stereopticon views were presented at the time, showing the use of concrete and expanded metal as applied to factory buildings, residences, school houses, etc. Views were shown of different buildings finished in cement, to represent almost all classes of stone work, as well as the ordinary smooth finish. These were followed by views showing the details of construction and afterwards a paper was read explaining how expanded metal may be used to obtain the best results. from an engineering standpoint. Among the views shown was one of a 2½ story residence, containing 16 rooms, the foundations, walls, floors. roof and partitions of which were constructed entirely of cement and steel. This building was finished complete, ready to move in, including hot water and modern plumbing, for about $6 per square foot of ground area covered. Views were also shown of a one-story warehouse, in which not one particle of wood was used in the construction, and which was built for $1.35 per square foot of ground area covered. The material by which these astonishing results were obtained is commercially known as expanded metal, a cut of which is herewith shown.

This material is made from a piece of steel, cut with the grain and pushed out or expanded into diamond shaped meshes, so that the original surface is greatly increased. Only the very finest quality of steel is used in the manufacture of this material. Each mesh is independent of all others and numerous strands may be cut without materially weakening the sheet. There are a number of separate and independent companies manufacturing expanded metal throughout the United States and about ten companies engaged exclusively in construction work. The headquarters in New England are at the offices of the Eastern Expanded Metal Co., 42 Court St., Boston.



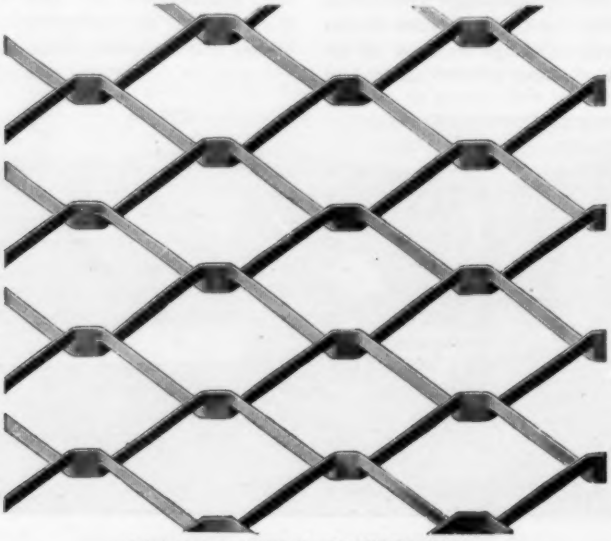
BUILDING OF EXPANDED METAL CONSTRUCTION.

That this construction is suitable for store houses and certain classes of factory buildings, is shown by the interest taken in it by Edward Atkinson, who has studied its development for the last four years. How well he thinks of it may be judged from the following extract, taken from the Bos-

tonManufacturers Mutual Fire Insurance Co.'s Monthly Report of Fires for February, 1898.

"In the judgment of the undersigned, the managers of all works in which buildings constructed of wood are subject to rapid deterioration, may well give attention to this developed type of expanded metal construction. It will interest the underwriters, being manifestly safer than many buildings, especially the small lightly built store houses. This type of construction may be adapted on a very large scale to one story storehouses, cut up into sections of moderate size, and although the wall itself might be liable to injury by the falling against it of heavy bales or cases, yet interior provision may be readily made to guard against that possible hazard."

We also present, herewith, an illustration of one of these buildings, which was built about a year ago in Pittsburg, Penn., and is owned by the W. & H. Walker Soap Manufacturing Co., of that city. This firm was so well satisfied with the building, that after giving it a thorough trial, they have built several more, in exactly the same style, except that some of them are three and four stories high. This represents a type of factory buildings with ordinary smooth finish. The walls are made with small channel-irons, bolted to the structural iron work and then covered with expanded metal lathing on which is laid a covering of Portland cement concrete, 2 inches tuick, completely enveloping the channel-irons and lathing. The floors and roof are made with four inches of cinder concrete and heavy sheets of expanded metal imbedded in the same, laid over tops of beams, the result being a floor capable of sustaining almost any load that may be imposed upon it in ordinary practice. This combination allows the use of a minimum amount of iron in the supporting structure, owing to the great saving in weight over the usual types of fire-proof construction, such as brick and terra cotta arches. A great saving is also made on the foundations, as the only supports necessary are the piers under the columns, the walls themselves being supported by the structural iron.



EXPANDED METAL—DIAMOND MESH.

The fact that this construction has come to stay is evidenced by the fact that it is rapidly superseding the old forms of fire-proof construction, in nearly all of the principal cities of the United States and especially in New England, where it seems to be an especial favorite with architects and engineers, enabling them as it does, to give their clients an absolutely fire-proof structure, at a very small advance in cost over ordinary wood construction.

An Automatic Warp Drawing-In Machine.

Some two months ago, a statement went the rounds of the daily press to the effect that an automatic warp-drawing-in machine had been invented and perfected by a Massachusetts man, and that it was controlled by Boston parties. Interesting as the statement was, (and by those familiar with the textile process it was received with great interest but some doubt) nothing very definite could be learned at that time regarding the matter. On March 15th, however, patents issued from the United States Patent Office covering all the broad features of the invention, and we understand numerous other patents are pending in that office, covering new and novel details of construction and operation and awaiting only the ordinary course of the Patent Office for issuance. On the same date, March 15th, applications for like patents were filed in all countries in the world where textile manufacture is carried on as a commercial business, including Great Britain, all the Continental countries, certain of the South American and South African countries, India, the Australian Colonies and Japan, as well as Canada and Mexico in North America.

A successful warp drawing-in machine marks a great step forward in textile processes and is undoubtedly one of the most important inventions relating to textile manufacture that has been produced in the latter part of this century, substituting an efficient, simple and rapid machine for what is now the only important step in the textile art where the work is necessarily done entirely by hand.

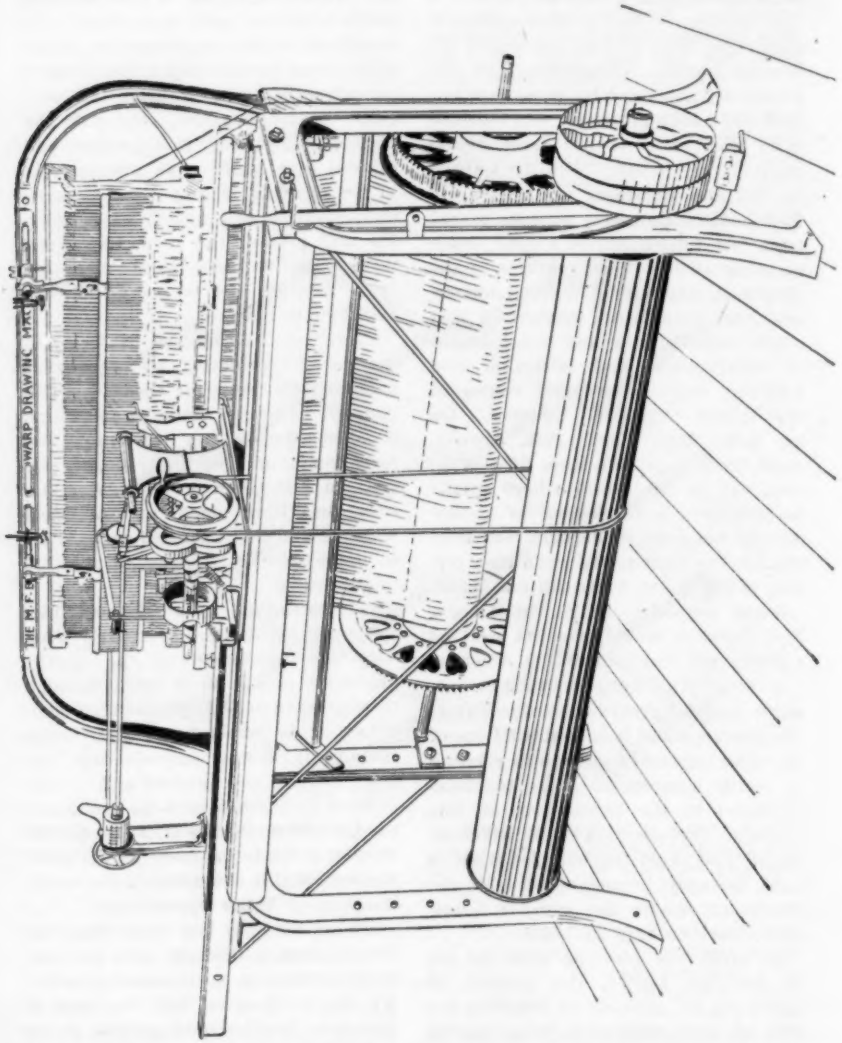
As every one familiar with the art of weaving knows, the process of "drawing in" consists in drawing the end of each respective warp thread through the proper heddle-eye in the harness and also through the proper dent in the reed, preparatory to placing the warp in the loom and starting on the process of weaving, the harness being a flexible cord or metal device for holding the warp threads and adjusting them after each pass of the shuttle in such a manner as to form the shed of the cloth, and the reed being a device in front of the harness to beat up each thread of the woof or weft after the passage of the shuttle. It is absolutely necessary to preserve the flexible character of the harness, and the flexible heddles of which it is composed crowd together and necessarily hang loosely, and it has seemed an impossibility to construct a machine that automatically and with the necessary accuracy would select and present the heddle-eyes successively to the drawing in needle for passage there-through, and equally so to separate and present the respective warp threads for the needle to act upon and draw through the proper heddle-eye and dent in the reed.

So difficult had seemed the problem that, notwithstanding the fact that many efforts, some of them very ingenious, had been made to solve this problem, during the last thirty or forty years, and especially during the last ten years, yet no successful machine has been made, and practical weavers and mill men had come to regard the solution of it as an absolute impossibility.

This invention, it is asserted, does this work rapidly and accurately, and, with one movement of the needle, draws the proper warp thread through its respective heddle-eye and reed dent. When it is remembered that warp threads in cotton manufacture run from forty to one hundred and twenty or more to the inch, and the heddles of the harness and dents of the reed from twenty to sixty or more to the inch, the remarkable character of the invention can be better appreciated.

All prior efforts had been along the line of dealing directly with the harness in selecting, spacing and positioning the heddle-eyes, but the basis of this new machine and process is the equipping of the harness with a simple device which does not destroy its flexibility or otherwise impair its efficiency, but renders possible the accurate handling of the heddle-eyes by a machine which is itself extremely simple and efficient. This device is called "a normally contracted, extensible spacer," is

easily and quickly applied, and lasts during the life of the harness. The same device, in a modified form, is applied to the spacing and positioning of the warp threads and applied to both harness and warp, these devices, moving along the harness and warp respectively and in unison with the carriage carrying the drawing-in needle, successively present the proper heddle-eyes and warp threads to the operation of the needle.



Those who have studied the difficulties of making a machine to draw in warps will appreciate in an instant this happy and simple idea of the inventor, which clears away at once the principal obstacles in the path. The machine is very simple, takes up very little space, weighs only about 250 pounds and the head motion or needle operating device weighs only about 45 pounds.

The machine has drawn warps at a speed of 300 draws per minute, but this high speed is not necessary and 180 is fast enough to accomplish wonderful saving.

The patents granted and applied for cover the whole field of textile manufacture, and in the cotton business alone of the world, there are at present engaged between ninety-five and one hundred million spindles, of which the United States has less than seventeen million. The inventor of this machine is Millard F. Field, a weaver and inventor of many years' practical experience, now of Boston and formerly of Newport, Maine, who has had associated with him from the beginning, Mr. Daniel H. Bishop of Boston. While some little further experimenting is to be done in order to select the best of various devices covering certain details, it is proposed soon to equip mills in the United States and other countries with the machines, which have their chief value, of course, in the fact that they are great labor-savers, although the other advantages are many. It is estimated that each machine will do the work of from ten to fifteen hands as the process is now carried on.

The enterprise is now strongly backed, and patents for the whole world are controlled by Messrs. B. P. Cheney and C. D. Lanning of this city. Mr. Lanning has had general control of the matter for some months, and will have general charge of the organization of the business on its legal executive side. Patents were procured through Arthur W. Crossley, of the firm of Crossley & Goddard of Boston. Mr. Crossley is an expert in textile machinery and the patent work has been thoroughly and carefully covered in all the countries mentioned. Although Mr. Field's patents just issued do not show the invention as adapted to the various conditions and equipments of looms, it is a fact that the machine as completed and as covered by other patents applied for is adapted for use on the several kinds or types of harnesses as well as in drawing for the various "weaves" and "cross draws." One interesting thing concerning this invention, indicating not only its value but the progressive spirit of our Western neighbors, is that it has already attracted the attention of some Japanese manufacturers and may be introduced very shortly into the mills of Japan and those controlled by Japanese capital in China.

The Foremen Dyer's Mutual Improvement Association of Philadelphia.

Lecture on "Dyeing in Antiquity," by Dr. L. J. Matos.

"Good thing wants good while," is as true as when the old trite saying was first pronounced. A good thing may be enforced where there is a commanding power, but where no such power exists, it requires a long while for a good thing before it is generally recognized, and works itself up to the surface. A fitting example is the organization of dyers in Philadelphia.

Some thirteen or fourteen years ago a "Dyers' Academy" was started by some leading dyers to promote the interests of the trade, and the social intercourse among its members, to cultivate high class workmanship, establish uniformity of prices, and of working hours, etc. Great things were expected, for the purpose was good. They bought a lot of books on dyeing, printing and chemistry, but few read them; they discussed topics of present interest, and there at once, the incompatibility of opinion of the old school dyers, and of the advanced dyers became apparent. Dissentions in puré matters of business developed into dislikes of a personal character. Harmony ceased to exist, argument became unavailing; the old dyers clung to their grandfathers' inheritance, and the progressists despaired of conquering their pertinacity. There was not exactly a split or break, but the members individually lost their enthusiasm, and becoming disgusted with the failure of their best efforts, dropped out one after the other, and the "Academy" collapsed, leaving the unsatisfied wish for improvement behind.

The regret of failure, however, kept the wish alive, and with the years rolling by intensified it until, in February, 1896, five leading dye-bosses, the most active members of the former Academy, issued to all foreman dyers of Philadelphia, a call to meet for organization for the purpose of bringing the members of the craft together in social intercourse, and in the discussion of their common inter-

ests and means of improvement. Scarcly more than thirty answered the call, and about a dozen immediately enlisted themselves in The Foreman Dyers' Mutual Improvement Association, on February 14th, 1896.

Accessions were slow, but they came. At the stated weekly meetings topics of general interest were discussed informally, or in answer to queries which were placarded on the bulletin-board. Dr. Louis J. Matos opened a class in chemistry, Dr. Max Kuttner delivered lectures on dyeing the audiences made up in attention and regularity what they lacked in numbers; but the subject of the Association was much talked about in dyehouses.

At the end of the vacation during the hot season, when only monthly business meetings were held, the talk in the dyehouses began to turn on the noticeable improvement in the work done by members of the Association. The entertainments given at the rented rooms of he club, and an excursion, to which the members introduced their friends, or employers, attracted more members, though slowly.

However the Association was able to establish itself in its present commodious and comfortably appointed quarters at No. 545 North Tenth street. There is no glitter and luxury about them, but solid good taste in carpeting, hangings, and furniture make them home-like and attractive. Members are furnished keys to admit themselves at any time, when they wish to consult technical books or periodicals which the liberality of publishers supplies, or are purchased as the case may be.

Since about a year, not only foremen dyers are admitted to membership, but able second-hands recommended by them, likewise; and a number of manufacturers, who were invited to witness the exercises at the clubhouse, or who noticed the improvement of the work done in their dyehouses, have either themselves joined the association as contributing members, or encourage their foremen and second-hands to join. The membership has, therefore, satisfactorily grown, particularly since the re-opening of the meetings and exercises in September last, and the class in chemistry is particularly well attended.

An interesting special lecture, "On dying in antiquity" was, on the evening of February 19th, 1897, delivered by Dr. Louis J. Matos, who has been promoted from the position of a factory chemist, in the J. J. & J. Dobson's mills, at Falls of Schuykill, to the prominent position of head chemist of the Philadelphia Museums. It is certainly a most enviable position which affords the incumbent opportunities and facilities of widening his knowledge, such as is scarcely presented by any other institution.

"Dyeing in antiquity," Dr. Matos said, "was not what we would call dyeing in our days. We have no sources of information on the process employed by the ancient dyers, and can only judge from the remnants of dyed fabrics which were found in the tombs of India, Persia, and Egypt, and of Mexico and American Indians. The dead bodies were wound round and round, completely swathed in about nine inches wide strips of linen or cotton, seldom woolen stuff, which have wonderfully perserved their various colors, owing perhaps to the great quantity of spices employed in embalming the dead, but they were rather stained than dyed.

"I am sorry that I cannot exhibit to you samples of such goods, because they are not under my control, but I can show you samples of dyestuffs which evidently were used in antiquity, and are still used in the Orient. They are all natural dyestuffs, and we, who almost exclusively use artificial dyestuffs, and scarcely know any others, would hardly think that natural dyestuffs are to this day used by people in our own country, who live in places remote from the routes of traveling agents of the great modern dyestuff works; and the Mexicans and Indians likewise use natural and scarcly any artificial dyestuffs.

"The fine distinctions of shades and

tones of color with which every modern dyer is familiar, were unknown to the ancients, who produced only simple colors in the most primitive way, pretty much of the same shade and intensity according to their coloring materials, and then sewed the colored strips together. Probably Joseph's 'coat of many colors' was made in this manner. Most of their dyestuffs consisted of vegetable juices, or decoctions or extracts of woods, roots, barks, fruits, flowers, herbs and leaves, insects, which were mixed with earths and clay; they also used colored earths; such as ochre, even lamp-black and coal-dust, which were fixed with albumen or sour milk (casine), while for the fixation of their vegetable dyes they used alum and probably the acid juices of some fruits, such as lemons and unripe peaches, which are still in use in the Orient. Those mixtures of vegetable extracts and earths, and those mineral materials were, apparently, in a wet condition pounded into the fibers before fixing them.

"The mixing of vegetable coloring matters with indifferent materials, such as earths and clays, which originally was practiced for the purpose of transporation, is still continued, and we find Indigo, catechu and madder largely adulterated with earthy matter, the latter especially with ochre which closely resembles in color the powdered madder root. This adulteration, however, is easy to detect by incineration, as pure madder should not give more than five per cent. ash.

"Fastness of color seems not to have been a particular object for the ancient as it is not to this day with the modern Orientals, who are in the habit to have their garments simply re-dyed when the color is washed out of them.

"Most of the natural dyestuffs are noted for their richness in tannins, and are, therefore, largely and preferably used in the preparation and coloring of leather. Remarkable in this regard is the Quebracho tree of Central and South America, where it grows in immense forests which have only recently been penetrated by the introduction of railroads. The extract from its wood has since immemorial times been used for tanning leather by the Indians, especially in Mexico; but with iron and copper, or with copper alone, it dyes a beautiful fast black, in every respect equal, if not superior to logwood black, and is used by cabinet-makers for the imitation of ebony. Other natural dyestuffs possess medicinal properties, while most of the woods, whose extracts are used in dyeing, or in tanning, are hard and fine-grained, and are used for building purposes and in the manufacture of furniture and utensils."

A Chemical Fire Extinguisher.

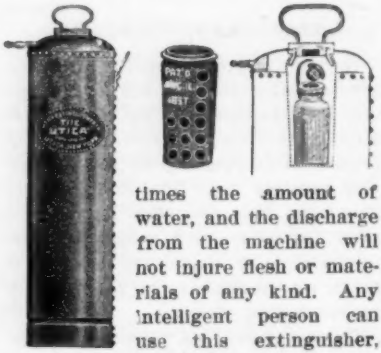
We have recently placed in our office several hand chemical fire extinguishers, manufactured by the Utica Fire Extinguisher Co., Utica, N. Y., for the protection of property in the case of any possible fire. The extinguishers made by this company impress us most favorably, and considering the testimonials of those who have used them, we should have no hesitancy in recommending them.

The accompanying illustrations will give one a good idea of its general construction. The solid lead hanger is the principal feature of the device. This hanger has the lead at the top crowded into a groove in the brass ring, forming the top of the machine, as will be observed in one of the illustrations.

Sulphuric acid, which is used in connection with this extinguisher, will not affect the lead, and for this reason, this material is used not only for the hanger, but for the stopple and handle for the acid bottle. The lead stopple fits perfectly tight, the ground top of the acid bottle excluding the air, and a rubber cap over the nozzle excludes the air and dust, which is a very essential element in this kind of extinguisher. With this kind of a stopple, these machines are adapted to being carried hastily to a fire, before discharging.

It should be the aim of every prudent property owner to have his prop-

erty protected in every possible manner, and this extinguisher contributes very largely to this end. The machine will throw a stream 40 feet, and is always ready for instant use. It has successfully withstood the test of time, and is in use in factories, public buildings, hotels, machine shops, hospitals, asylums, wholesale and retail establishments, club houses, car shops and private residences. The extinguisher is made to test 200 pounds pressure, and will instantly extinguish burning oil, tar, resin or anything inflammable. The extinguisher is charged with chemicals, which are equivalent in their effectiveness to twenty-five



times the amount of water, and the discharge from the machine will not injure flesh or materials of any kind. Any intelligent person can use this extinguisher, which is claimed to be the best hand chemical fire extinguisher on the market.

The extinguisher is constructed of the evry best cold rolled copper, coated on inside throughout with lead.

The acid bottle is confined in a shield-like solid lead hanger, the part without holes being placed opposite the nozzle, which makes it impossible for the acid to escape until thoroughly mixed with the other chemicals.

The total height of the machine is 21½ inches. The two gallon size has a capacity of putting out over 4,000 cubic feet of flame.

When charged according to directions using plenty of salt and good sulphuric acid, it will not freeze in the coldest weather which makes it valuable for lumber yards, saw mills, stables, etc.

Some of the parties using this extinguisher are as follows: Fulton Worsted Mills, Fulton, N. Y.; Victoria Paper Mills Co., Fulton, N. Y.; Expres. Benj. Harrison's cottage, Fulton Chain, N. Y.; Standard Furniture Co., Herkimer, N. Y.; Athletic Knitting Mill Co., Utica, N. Y.; Highland Knitting Mill, Utica, N. Y.; Saxony Knitting Co., Little Falls, N. Y.; Little Falls Knitting Co., Little Falls, N. Y.; Mechanicsville Knitting Co., Mechanicsville, N. Y.

Microscopic Examination of Textile Fibres.

Flax is composed of the bast fibres of the stem of the flax plant (linum usitatissimum). Like cotton, they consist of pure cellulose, are of regular thickness, and averages from 25 to 30 MM in length. The cells are regularly built up, cylidrical in shape with nodes arranged at regular intervals. The nodes are stained more decidedly with methyl violet or more deeply when treated with zinc iodochloride. The cell wall is of constant thickness and leaves but a narrow internal channel, which appears therefore merely as a dark line and is in many cases undistinguishable. The spun fibres are mostly folded longitudinally, and the natural ends are sharp pointed and generally long drawn out. A characteristic appearance is afforded by the cross section, which exhibits a number of loosely joined, acute-angled polygons, without any yellow circumferential stain when treated with sulphuric acid, and the lumen showing as a yellow spot through the protoplasm. The fibre is free from woody fibre, and swells up in ammoniacal copper oxide without dissolving completely therein.

Microchemical Reactions.—Iodine and sulphuric acid give a blue stain, less quickly developed than in the case of cotton, madder tincture, orange, fuchsine, followed by a little ammonia, gives a permanent rose coloration (distinction from cotton), caustic soda, faint yellow stain.

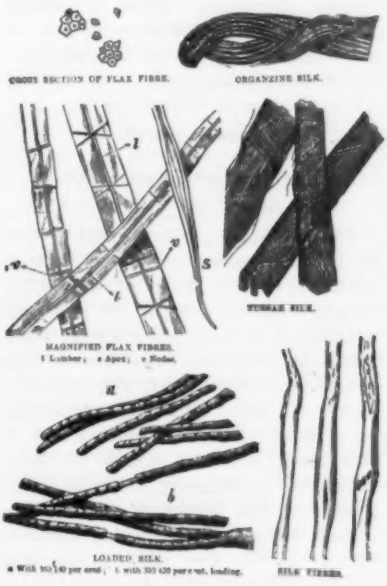
Other means of detecting cotton in linen goods are afforded by:

(a) Treating the mixture of cotton and linen with a solution of caustic potash (1:6). The flax will become

more curly than the cotton, and the latter finally turns grayish white, whereas the flax is dyed orange color (Kuhlmann method).

(b) Treating the mixture with a stronger solution of caustic potash (1:2) by boiling for two minutes then washing, and drying between blotting paper. Flax becomes a deep yellow, cotton whitish or straw color (Bottger's method).

(c) The mixture is boiled in water and then steeped in concentrated sulphuric acid for two minutes. Cotton



is dissolved but linen remains white and unaltered, and can be separated by washing with a weak solution of caustic potash.

(d) The mixture is boiled in water, dried and dipped for a few moments in thin, clear oil or glycerine and then pressed. Linen, by its greater capillarity becomes transparent, whilst cotton remains opaque (Simon's method).

(e) The mixture is boiled in water, dried and dipped in a strong solution of common salt and sugar, the fibre being then burned over a flame. Linen leaves a gray, cotton a black, ash (Chevalier's method).

(f) The mixture is dipped in an alcoholic 1 per cent. solution of fuchsine, washed and then laid for three minutes in ammonia. Cotton remains uncolored, but flax is dyed rose-red (Bottger's method).

(g) The mixture is dyed in an alcoholic extract of cochineal (or madder root). Cotton becomes pale red (or yellow), but flax is dyed violet (or orange, or red) (Bolley's method).

(h) Cotton thread, when viewed by the eye appear of regular form throughout, whereas flax threads are irregular. When quickly torn across, cotton threads curl up, but flax threads remain smooth: an accurate judgment by this means is, however, acquired only after long practice.

Silk is the fibre with which the larvae of various insects surround themselves before entering the pupal stage, the envelope being termed a cocoon. The cocoon thread results from the hardening of the fluid ejected from the two serecteria of the larva; hence it follows that silk exhibits no definite structure, but consists of cylindrical, sometimes flattened, or more rarely, helical (twisted round the axis) compact threads. The color is white, pale or dark yellow, or occasionally reddish, the coloring matter being contained in the external layer, so that when this is removed the silk is white.

The different kinds of silk are distinguishable by their diametrical dimensions, and by the more or less decided appearance of longitudinal stripes, or by polarisation colors. In examining raw silk, it is advisable to first boil the sample in a solution of soap. Chemically considered, silk is composed of three chief substances:—

(1) Silk gelatin or sericin (22.5 per cent.)

(2) True silk fibre or fibroin (63 per cent.)

(3) Fat, resin, coloring matter, and mineral substances (about 2 per cent.)

Under the microscope silk appears as a smooth (more rarely striped) cylinder without any contents; in contradistinction to vegetable and wool fibres both lumen and scales are lack-

ing. Mostly the silk appears as a double thread.

The fibre dissolves with difficulty in soda and potash solutions; sugar and sulphuric acid dissolve it with a rose-red coloration (albumin reaction), hydrochloric acid with violet coloration. It burns in the same manner as wool, but since the fibre contains no sulphur, no smell of horn is evolved: otherwise it contains all the other elements present in wool, viz., carbon, hydrogen, oxygen and nitrogen.

The Bombyx Mori insect produces the most valuable silk and the greatest bulk of the so-called "true silks." The raw fibre is either white or yellow in color, exhibits no structure, and is rarely striped. When treated with dilute chromic acid, the thread assumes a fine fibrous structure. Polarisation colors are very clearly exhibited.

Chappe silk, also known as "spun" silk, from silk-spinners's waste and from inferior cocoons, is difficult to distinguish from pure silk under the microscope. According to Hohnel, it can be differentiated, with more or less accuracy, by the irregular form of the thread, and especially by the remarkable irregularity of the surrounding envelope of sericin or gum.

Tussah silk known as "wild" silk, is gray to brown in color, and has a vitreous lustre. The fibres appear as double threads, not, however, structureless, like true silk, but composed of a bundle of very fine fibres (fibrillae), manifested by parallel longitudinal stripes. Polarisation colors are but slightly apparent. The cross section is an elongated quadrilateral, and a number of fine and dense granules are displayed therein.

The accompanying illustration of loaded silk is very instructive, showing as it does, that the microscope can be of good service in detecting either low or high loading. In the latter case the thread appears to be entirely surrounded by the loading material, the rind being thicker than the fibre itself. In the case of lesser loading, it can be seen that the color is taken up by the fibre.

In view of the considerably lower value of the artifical silks, such as are offered by Chardonnet, it becomes important that we should possess means of identifying these also. The most suitable indications are the chemical and physical characteristics; for example, the inferior strength and elasticity of artifical silks, and their deficiency in the "crackling" feeling observable in handling true silk. When dissolved in caustic potash they produce a yellow (pure silk a colorless) solution, and they are insoluble in an alkaline solution of copper containing glycerine. These properties render the quantitative separation of artificial and natural silks possible.—Dr. J. Herzfeld.

Textile Fibres.

Lecture by John Butterworth, delivered at Shaw, England.

There is one property that textile fibres must possess to enable them to be made into a yarn of any kind, namely, cohesiveness or the power of holding on to each other during manipulation and after completion. This power in smooth fibres, whether comparatively round as in silk, or angular as in hemp, jute, and other fibres of this class, requires length of fibre, which is a necessity. Cotton fibre possesses this power of holding together during the preparing process, owing to the fact that every full grown and perfectly developed fibre has a natural convolution or twist which gives it considerable adhesiveness. But it is in the wool fibre that we have this power of adherence best illustrated.

The animal, vegetable, and mineral kingdoms all contribute to our supply of textile fibres, and all possess the above cohesive power in a greater or less degree. There is one class, however, supplied us by the mineral kingdom which has but a very limited power of holding together during manipulation, the tender and slippery nature of the fibre rendering it necessary to avail ourselves of the processes that are used in dealing with

the shortest of fibres in cotton and wool. Very litttle asbestos (which is the fibre I am alluding to) can be made into yarn by the usual processes of attenuation by drawing rollers, as in cotton spinning, hence much of the yarn is prepared on the condensing carding engine. It is then twisted afterwards without drawing, as in the treatment of the shortest of wool and cotton fibres. Notwithstanding the difficulties attending the manufacture of asbestos, mill managers and engineers know the value of it for mill purposes.

I must here recall your attention to my opening sentence, namely, the necessity of some cohesive capacity in all textile fibres. Silk and the long combing wools possess this holding power by reason of their length, as before remarked. It is so also in regard to flax, China grass, hemp, and jute, but in the short wools and cottons cohesion is dependent on the structural contour of the outside of each fibre. These remarks may lead some to think that when textile fibres get so short that they lose their necessary adhesion to one another they are useless; and so they would be were it not that artificial means are introduced to give them some cohesive power. I recollect very distinctly that during the American cotton famine I sprinkled my mixings of short East Indian cotton with a solution of castile soap to impart some adhesive power to the fibre. This was one reason, but another was to prevent the heavy loss in the opening and carding processes. Yet the chief reason was to meet the former difficulty; and this plan of giving adhesiveness to short cotton fibres was in vogue some years ago in dealing with some of the low classes of broken-up cop bottom waste, and may possibly be so still. Such waste as the above is used for candle wicking, wicks for wax matches, lighting-up tapers, and for manufacturing into cotton bed-sheets, etc. When the American cotton famine overtook us it found the bulk of Lancashire cotton spinners with machinery only prepared for dealing with American cotton and the longer grades of East Indian, so there need be no wonder that recourse was had to sprinkling such short cottons as had to be used at that time with either castile soap or any other solution to add a little adhesive power. In the spinning of very short wools such as are extracted from broken-up woolen rags a different method is adopted; still it may be called an artificial one. In this case advantage is taken of the scales that cover the outside of all wool fibres in a greater or less degree, and by mixing a small percentage of longer wool the short fibres attach themselves to the long fibres, and are carried forward and formed into a thread. The same plan is adopted in dealing with very short cotton fibres to form into candle wicks, etc., but in the case of these the object of blending a certain percentage of long fibres with the short is twofold, namely, to give strength to the yarn as well as to hold the short fibres together. It is the same in dealing with mixed lengths of wool fibres, but not to the same extent as in cotton.

No method has yet been discovered by which the shortest of fibres of either wool or cotton can be spun, except by the judicious admixture of a number of long fibres among the very short wools, or of long, stapled cottons among the very short cottons; and in each case they carry the short forward and wrap it up to form a thread, as no other method than the condensing system of engaged in spinning on the woolen system who really are aware what a power we have in this system of using up the very shortest of fibre in both wool and cotton, for goods that possess no mean appearance in the finished state. It may, however, be said that strength as well as artistic show is usually required in all kinds of cloth; so it is, but in these days of rush everything has to give way to the cheapening of the cost of production, and lowering the selling price of the finished article. Even moral principles are sometimes set aside to

accomplish this end. Happily the system of manufacture we are discussing is capable of contributing both strength and artistic merit to the goods that can be produced by it. I am sorry to say that this system, as far as cotton is concerned, is nearly lost to us. We have let the Germans and Belgians appropriate it, and practically all our cotton waste now goes to the Continent to be made into such goods as bombazines, cotton flannels of the heavier kinds, cotton bedsheets, horse blankets, with several other kinds of cloth of no mean appearance and use. I have been induced to dwell on this system of manufacture because the Germans have a good thing out of this trade. Had we kept it when we had it, which we could have done, it would have absorbed some of the unemployed labor we now have on our hands.

Before leaving this part of the subject, however, I wish to draw your attention to a principle underlying both this and other branches of spinning textile fibres, namely, that all the longest fibres which contribute to form a thread of yarn work their way to the centre of it, the shorter fibres forming the outside being more or less loosely compacted. This phenomenon takes place in all yarns unless the fibres could be guaranteed of uniform length. When a yarn is made of mixed lengths of staple, even if you adopt the woolen system of spinning, the strength of the yarn is only equal to the strength of whatever number of fibres form the centre or core of the thread, unless an excess of twist is put in to draw the short fibres together and thus to form a closer body of thread or yarn. There is one thing I have noticed in studying this most interesting subject, and it is a surprising one, namely, what an amount of short cotton fibre can be made to adhere to a few long fibres when they are spun on the woolen system of stretching and twisting. It is also most interesting to see how the long fibres will wriggle their way to the centre of the thread during its attenuation, forming themselves into a core.

I may remind you, however, that although the mixing of long and short fibres is admissible in spinning cotton on the woolen system, it is not so under the usual system of drawing by rollers. In the attenuation of a sliver by drawing rollers, if all the fibres are not of the same length, those that are longest are sure to get to the front, and to leave the short to take care of themselves. But in spinning on the woolen system, while the long fibres still keep to the front, they do not lose hold of the short, which should form the bulk of the thread. I think it is well understood that if extremes of length of staple are mixed in spinning by draft rollers, twists are sure to result; but it may not be generally known that if extremes of hard and soft cottons are mixed together a similar result will occur, but in a worse form.

(Continued.)

A Yarn Glut.

The Japanese cotton spinners are reduced to an embarrassing condition, says the "Japan Times," owing to the glut of yarns. The 800,000 spindles now running in Japan produce more than the demand at home, and so the surplus has been used to be disposed on the Chinese market. But the abandonment of the silver standard and the subsequent depression of silver caused a considerable rise in exchange rates with China, which have given a fatal blow against the Chinese trade, and the yarns have come to cease from being exported. On the other hand, the demand at home has sunk to a very dull state, some weavers having suspended or diminished their works, even the contracted goods being often rejected. This state of affairs may be ascribed to several causes, such as the anticipation of poor crops in the country, the rise in price of rice, and the higher rates of interest. Such being the adverse conditions the spinners are encountering at present, they are said to have no means but to diminish their volume of production by stopping night work and producing chiefly the higher counts of yarns, the demand for which is more or less active.

Rough Peruvian Cotton.

Peruvian cotton consists mainly of two varities, native and exotic. The latter is grown from seed introduced from the United States, and yeields what is known in the market as "smooth cotton." The native variety is a product of the "Gossypium Peruvianum," a perennial shrub growing from ten to fifteen feet high, and found in the tropical countries of South America, and most abundantly in the coast districts. It flowers and bears fruit for about seven years, though most abundantly and of the best quality after the rainy seasons in the second, third and fourth year's growth. The cotton yielded by this plant is long, strong, rough, crinkly staple (called vegetable wool) and therefore excellently suited for admixture with wool, for many purposes of manufacture. Its price has no relation whatever to the value of other descriptions of cotton, but is regulated by the price of "wool" and the supply of rough Peruvaian cotton.

Cotton Yarn.

The American Spinners' Cotton Yarn Exchange report that Egyptian cotton is in good demand, holding a firmer position, with a tendency of prices against buyers and likely to advance. The supply is small. Northern spinners all report being full of orders, especially on fine counts, singles and two-plys, and many orders have been turned down, owing to an inability to fill them. Prices for those yarns are very firm, and spinners ask a higher range of values. Combed hosiery yarns are difficult to obtain. Both the Egyptian and the Peeler products of all the mills are sold on orders at full value. Carded hosiery yarns are not in quite such an active demand, yet they keep remarkably well up in value, with no signs of any concessions being made by the large spinners. The production of Southern spinners is under good control, especially two-ply yarns and warps. These are sold ahead for many months, and many mills are running night and day.

—Recently-issued reports on the Russian cotton crop indicate that area was considerably extended in Turkestan, Khiva and Buchara in 1896, and that while the yield per acre was not so great as in the previous season, the aggregate production increased. According to the same reports, the deliveries of Central Asian cotton in European Russia via the Trans-Caspian Railway were 4,194,191 poods (pood equals 36 pounds) in 1896-97 (Oct. 1 to Sept. 30), against 3,475,392 poods in the preceding year and 3,161,843 poods in 1894-95. Reducing these figures to American weights would give us 309,182 bales of 500 lbs. each for 1896-97, against 250,228 bales and 227,653 bales respectively in the two previous seasons.

Skirted Wool.

The question of skirted wool has been brought to the attention of the Treasury Department, Washington, by the United States charge de affairs at Buenos Ayres, in regard to the dutiable classification of Argentine skirted crossbred wool, to the effect that it was represented by prominent wool merchants at Buenos Ayres, that a discrimination was made by our custom house authorities, at Boston, against septuple Argentine crossbred wool, in favor of Australian wool. This matter was submitted to the examiner of wool at the port of Boston, and he reported, with the approval of the appraiser at that port, stating that no discrimination is made in favor of Australian wool of the same class, against septuple Argentine crossbred wool. The dutiable classification of both being dependent upon the fact whether the same are skirted or sorted, or handled in any different manner than in "1890 and prior thereto." Buenos Ayres wool if prepared and packed for shipment to the United States in conformity with the methods employed prior to 1890, will be entitled to entry at a single rate of duty of 11

cents per pound under the act of July 24, 1897. Both Australian and Buenos Ayres wools, if sorted or skirted, handled and packed in any other manner, as contemplated by paragraph 356 of the act of July 24, 1897, will be chargeable with the double rate of duty of 22 cents per pound.

America Ahead.

As examples of what American manufacturers are doing abroad, the following is related: A London concern, desiring to buy a large lot of fine tools, made inquiry of a manufacturers' agent in London and learned that the tools could be bought as cheaply from the United States as from the English makers. Being anxious to fill the whole order as quickly as possible, it was divided, one-half being given to an English concern and the other half, by cable, to the Standard Tool Company, Cleveland, Ohio. The Cleveland concern, receiving the order on a Monday morning, went to work on the order the same day, and completed the work so rapidly that the goods were shipped and reached London just two weeks after the order was given. On the other hand, the English concern worked on their share so deliberately that their goods were not delivered in London until sixty days had passed. The Standard Tool Company are now busy on an order for 9,000 twist drills for one of the shops of the French government. This order cannot be broken, but the whole number of drills must be shipped at one time.

Waterproofing Process.

We have had a number of inquiries from different parts of the country for a method of waterproofing fabrics, etc. As a partial reply to many of these inquiries, we will refer to a valuable invention that was patented in England, October 6, 1896, for waterproofing silk, cotton, wool and other threads and fabrics, in which sulphate of alumina and acetate of lead solutions are mixed, and, after precipitation, solution of tannin is added. After the further precipitation takes place, the clear liquid is ready for use as a waterproofing solution. The solution is applied to the threads, after dyeing and before weaving, or in some cases to the woven fabric. The patent was granted to W. C. Kipling and A. E. Sudbury. The process has been considered of sufficient importance in England, to warrant the owners of it to publish a warning against any person found infringing the process, and the owners intimate that specimens of the material hitherto purporting to be waterproofed by secret and other processes were examined prior to their application for patent, and they have been advised that any infringment of their process can be readily detected. All persons to whom silk, woolen or cotton goods may be represented as waterproof by any new process are warned against the use of it. We give this for what it is worth. We will add that the specifications of letters patent have just been received in this country.

Cotton Market.

Middling uplands, at present writing are quoted at 6 1-16c. against 6 1-4c. last month. The state of the market is one of extreme uncertainty, on the eve of the planting season, owing to the state of the manufacturing industry here and abroad. There is a dull, dragging trade. The belief that the South will reduce its acreage for the coming season is pretty nearly given up, and the general expectation is that the acreage will be quite as large as that of last year, and the production per acre slightly increased, due to the freer use of fertilizers. The feeling exists that the planters did pretty well last year, notwithstanding the low prices that they received for their commodity. Latham, Alexander & Co., New York, in a recent circular, stated that "the necessity for a reduction in acreage this year should appeal to every farmer with great force, and induce him to largely increase the

production of food crops." This advice may seem a good one, but experience has shown that food products on the interior plantation, beyond the consumptive wants of the planter himself, are seldom profitable investments. It is hardly to be expected that wheat and corn will take the place of cotton, as the wheat belt of the South does not extend to the most productive cotton sections of that region, and corn at present prices is not worth more than cotton at four cents a pound. By reviewing the export statistics, it is seen that one million more bales have been sent abroad than during last season, up to the present time, which is accounted for upon the idea that spinners think that cotton is cheap and its price will not be lower. The same reason is also attributed to the increased takings of our Northern spinners, to the extent of 300,000 bales over last season, since September 1. If such is not the reason, it appears strange that this increased amount of cotton should be taken, considering the depression in cotton manufacturing. The indications are strongly in favor of an eleven million bale crop for 1897-98. From present appearances the current season is sure to end with a large supply of cotton in the hands of spinners here and abroad, and at the ports.

Wool Market.

The wool market is in an extremely quiet state. Dealers and manufacturers feel more in a waiting mood than anything else, considering the conditions surrounding the supply and consumption. There is no apparent reason for any decline in the price of the commodity, as there is an innate strength to the market, not only in the attitude of the wool growers, who propose to hold their spring clips for a material advance over the prices obtained a year ago, but the foreign markets manifest a strength that allows of no idea of an early decline. The only condition that militates against an increase in the price of wool is the not over and above favorable state of manufacturing. The demand for goods is not satisfactory at the prices that are placed upon them, which at the best yield to the manufacturer but an extremely small percentage of profit, except on goods that are made from wool that has been held over from the purchases made previous to the passage of the tariff act. There is a tendency to take up low grade goods, in which wool substitutes, as cotton and shoddy, appear, to the detriment of the better grades. Staple wools show the most strength, still there is no activity in them, and 31 cents must be considered as the best price for Ohio. Some of the medium territorial wools are bringing on the basis of 42 cents clean. Australian wools are selling on the basis of 70 cents clean for 64's and 72 cents clean for 70's. According to a late report from the United States consul at Montevideo, the wool clip of Uruguay is estimated at 90,000 bales, of which 70,000 have been shipped almost wholly to the European markets. These wools are referred to in a recent advice from Liverpool, in which their condition is spoken of as being especially good, owing to the very few seeds or burrs in them, with the consequence that they are commanding keen attention.

—Warps for satins, which generally contain a large number of warp threads, would be beamed very solid, in order to ensure safety in weighting heavily, with a view to producing cloth with the requisite smoothness of surface.

—It is easy enough to impart a decidedly silky appearance to a short length of a cotton fabric of suitable texture by keeping it tightly stretched over a frame until it has been treated with alkali and washed; but to make the process a continuous one, and to otherwise conduct it with due economy, will, with what machinery has hitherto been available for similar purposes, be found a somewhat difficult matter.

23190 * Apr. 11. 98.

COTTON DEPARTMENT.

American Cotton Spinning Machinery.

CHARLES CLIFTON HEDRICK.

ARTICLE I.

(Copyright.)

Owing to the constant increase of competition in cotton manufacturing, the cotton mill of today must be equipped throughout with thoroughly modern machinery. Poorly equipped mills, although sometimes favored by local conditions as regards labor, fuel and freight, cannot compete with their less favorably situated, but better fitted, competitors in the character of the finished product.

Our attention will be first directed to the opening and picking operation, which is the first mechanical process the cotton undergoes after it is received at the mill. Briefly stated this process is to remove as much dirt, leaf and other foreign substances as possible, from the cotton, with the least injury to the fibres.

The various styles of machines, used for this purpose, differ very slightly in principle, each having some features which are peculiar to each particular make. Fig. 1 shows a sectional elevation of a modern cotton mill, equipped with what is known as the three process system. On the first floor is the automatic feeder, connected to an opener which in turn is connected by a cleaning trunk to a single beater breaker picker, with a condenser and gauge box, on the second floor. There are also, on the second floor, a single beater intermediate and a single beater finisher, these provided with eveners and the finisher usually having a carding beater instead of a rigid, or knife beater, as in the other machines.

It will be seen that the fans, of all the machines, discharge into the dust room, which is beneath the opening room, through galvanized iron pipes, "H" each pipe being provided with an automatic closing damper, "K," which is kept open by the pressure of air in the pipe, but when a fan is stopped the air pressure ceases and the damper closes of its own weight, assisted by the pressure in the dust room, produced by the other fans. This automatic closing of the damper prevents the dust from blowing back into the machine when it is not running.

The dust room is provided with a chimney, or flue, leading to the open air, to prevent back pressure, and has an area of at least three square feet for each fan. The floor of this room is usually cemented and the overhead woodwork covered with tin or any fire-proof substance. The heavy dust

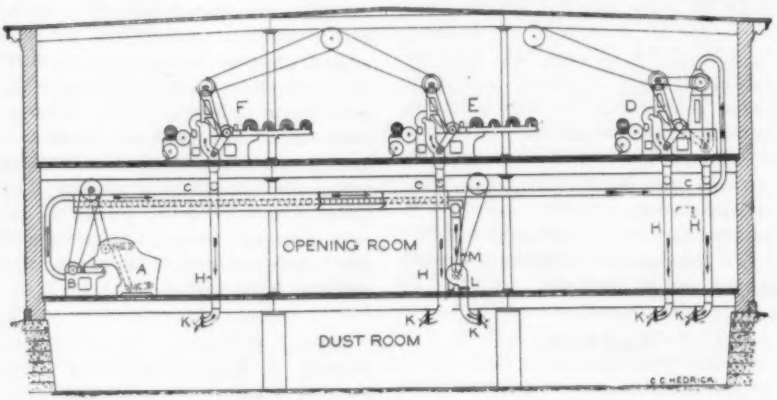


FIG. 1.

and leaf settle to the bottom of the room while the light dirt passes out with the air.

The arangement of the several machines, necessary in this system, depends somewhat upon the location of the carding machinery; the aim being to have the laps from the finisher picker delivered upon the same floor and as near the cards as possible in order to save time and expense in carrying them from floor to floor and to avoid any unnecessary handling of the bales of cotton. Of course, this cannot always be done, particularly in some of the older mills, but in planning a new mill this should be borne in mind, not only in the picking process but in all of the necessary operations.

By again referring to Fig. 1, it will be seen that the opening room is on the first floor and the finisher pickers on the second floor, the same level as the card room. This arrangement may be reversed when the cards are on the first floor, the opening room then being on the floor above. Sometimes the finisher pickers are located on the third floor and the openers on the first, the cleaning trunk passing up through the second floor. In a case of this kind the cotton is often mixed on the second floor and dropped down through openings to the openers on the floor below. Still another arrangement, which is found in many small mills, is to have all of the machinery on one floor when the cleaning trunk is seldom used. Of these different arrangements more will be said later on.

The cotton, which is thrown into the hopper, "A," of the automatic feeder, is taken from several bales, from which it is desired to make the mixture, or from a mixture previously formed. From the hopper it is delivered to the feed apron of the opener, "B," by which it is carried forward between the feed rolls to the beater. Most openers have a three bladed beater about twenty inches in diameter. Beneath the beater is a grid through which the dirt is driven as the cotton is drawn over its surface and up through the cleaning trunk, "C," to the breaker picker, "D." The starting and stopping of the feed of both opener and feeder are controlled by the breaker picker.

The cleaning trunk is provided with a grid surface over which the cotton passes to the breaker picker. The dirt and particles of leaf, which are heavier than the cotton, settle between the grids into pockets, directly beneath, which may be cleaned out when necessary.

The cotton enters the breaker picker through a condenser and guage box which delivers it to the feed apron. It then passes forward, through the feed rolls, to the beater which is also usually three bladed, where it receives a most thorough cleaning. Passing forward over inclined grid bars, through which some of the loose dirt falls, it is deposited upon two slowly revolving cages or screens. From these cages the cotton is drawn forward between several calender rolls, formed into a sheet and wound upon a lap roll. This is the first formation of a lap in the process.

The laps from the breaker are now taken to the intermediate picker, "E," to undergo another cleaning and picking. Four laps are placed upon the apron of this machine. This is the first doubling of the laps. The cotton next passes through the intermediate and is formed into a lap in the same manner as in the breaker picker. From the intermediate it passes to the third machine in the process, the finisher picker "F," which is substantially the same as the two previous machines, the laps being doubled, four into one, on the apron. Here the cotton is formed into a finished lap ready for the card. As before stated both the intermediate and finisher pickers are usually provided with eveners, of which several styles will be shown.

A contrast between the old style method of feeding and the present way, with the automatic or hopper feeder, may be interesting to some. In the old style method, the feed apron was divided off, every yard or two, usually by painting some of the apron slats a darker color than the rest and the attendant would place an armful of cotton on a pair of scales, set to

some particular weight, and then spread the amount between the divisions of the apron. The attendants were often careless, sometimes the weight of their arms was included with the cotton, while at other times they simply went through the motions of weighing, not even looking to see whether the scales balanced or not. Frequently, when pressed for time, they would take an armful from a bale and throw it on to the apron regardless of the amount. It will be readily seen that this method could not be satisfactory in any way.

Fig. 2 shows a section of an automatic feeder, connected directly to an opener. The hopper, "A," is kept

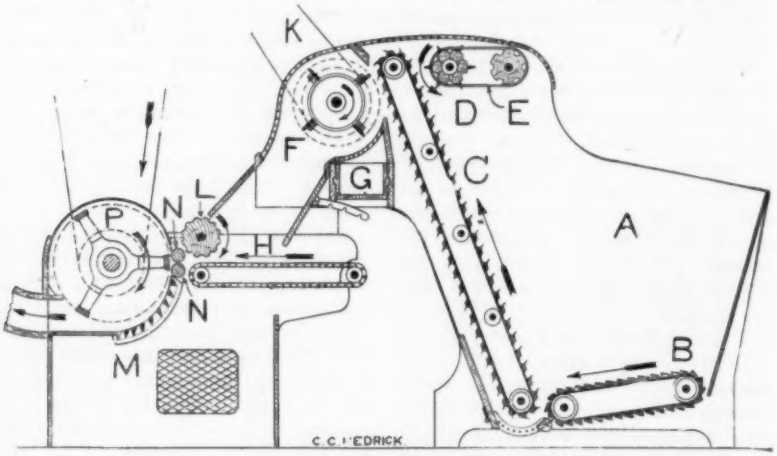


FIG. 2.

from one-half to two-thirds full in order that the cotton shall be fed as evenly as possible. The bottom of the hopper is formed by a horizontal apron, "B," called the bottom apron or lattice, by which the cotton is carried forward against the elevating apron, "C," which runs in an almost vertical position and which is supported at intervals by carrier rolls and consists of a heavy canvas belt, backed with leather strips, fastened to which are wooden slats. Projecting from these slats are pins by which the cotton is caught and carried upwards. At the top of the elevating apron is situated the spike roll, "D," which is about six inches in diameter and has steel pins or spikes projecting about three-fourths of an inch from its surface. The object of this roll is that it should strike off any surplus bunches of cotton, which cling to the elevating apron, and to regulate the amount of cotton that is carried forward to the opener. Around the spike roll runs an endless leather apron, "E," called the spike roll apron, which has slots or openings in it corresponding in position to the pins of the roll and through which the pins project as the apron passes around the roll. Any cotton that is disposed to collect on the pins is readily stripped off by this means.

The amount of cotton, which is delivered to the opener, is regulated by the position of the spike roll, which is adjustable, horizontally, thus the greater the space between it and the elevating apron, the more cotton is allowed to pass. In order that the spike roll shall stand parallel to the elevating apron and that the roll shall be moved parallel with it when changing its position, indexes are located on the outside of either side of the hopper by which the exact position may be noted. Between the lower end of the elevating apron and the end of the bottom apron is a space of about one and one-half inches which allows dirt and other foreign substances to fall through into the hopper screen. This screen can be dropped and the dirt removed when necessary.

The cotton, which is left upon the

pins of the elevating apron after it has passed the spike roll, is next acted upon by the doffer, "F." This is driven from a countershaft by the belt, "K," and is about fifteen inches in diameter and has extending across its whole face, four wooden blades, faced with leather, which are sligtly in contact with the pins of the elevating apron and, as the doffer runs about 160 revolutions per minute, a continuous series of blows are given by which the cotton is stripped or beaten

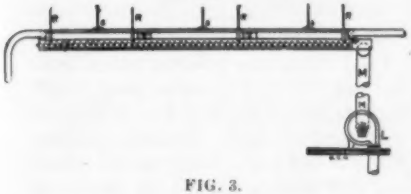


FIG. 3.

from the pins and thrown against a screen or grid, directly beneath the doffer, called the doffer screen, through which any loose dirt will fall. Beneath the doffer screen is a dust drawer, "G," which receives dust and dirt that is beaten out by the doffer. From the doffer screen the cotton passes down an incline on to the feed apron of the opener, "H," being assisted by the current of air produced by the doffer.

The cotton is next carried forward by the feed apron, passing under the press roll, "I," to the feed rolls, "N." The press roll condenses the cotton, that it may be readily drawn between the feed rolls which being small in diameter could not receive it in a loose form. After passing the feed rolls the cotton is acted upon by the blades of the rigid beater, "P." This beater consists of three steel blades, running across the width of the machine, which are securely riveted to four or five sets of arms or spiders which are fastened to the beater shaft. These blades are slightly bevelled on each edge, but not enough to cut the cotton, and, as they become dulled by constant use, the beater is reversed in its bearings and the other edges brought into use, both ends of the beater shaft being made alike for this purpose.

The beater runs from 1200 to 1500 revolutions per minute, therefore each inch of cotton, delivered by the feed rolls, receives a great many blows, by which it is opened, cleaned and removed from the feed rolls in small tufts which are thrown with considerable force against the beater grid. Thus the dirt, seed and heavy impurities, which are struck down with the cotton, fall between the bars into the space below, while the cotton, which is very light is prevented from passing through with the dirt by the current of air, which draws it through the trunk to the breaker, and which is produced by the fan in the guage box section of the breaker.

Figs. 3, 4 and 5 show details of the cleaning trunk which connects the opener and breaker picker. Fig. 3 shows the whole length of the grid or cleaning surface, about forty feet usually being sufficient for all but very dirty stock. The trunk is hung from the underside of the floor above by rods, "R," placed about ten feet apart, lengthwise and upon each side, and, as many of the fires which occur in the picker room are caused by the beater in the opener striking some hard substance, means must be provided to prevent injury to the trunk, which, being of wood, very easily takes fire. To prevent this, automatic sprinklers, "S," are placed at suitable intervals along the top of the trunk, opening into the passage through which the cotton is drawn, a very slight fire

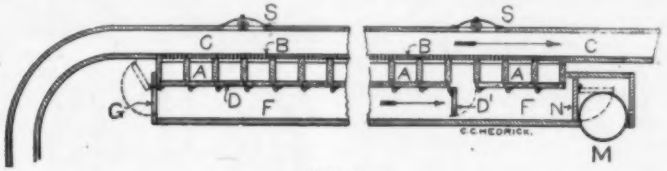


FIG. 4.

causing the sprinklers to operate. At one end of the trunk is a galvanized iron pipe, "M," connected to a fan, "L." This is for the purpose of cleaning the trunk which must be done regularly. Usually the fan is connected to the end of the trunk nearest the opener, as the greater portion of dirt falls out of the cotton before it reaches the farthest end of the grid surface, but for convenience it is sometimes connected to the other end, and, in order to show the arrangement without obstructing the view of the opener, it is placed in this position in Figs. 1, 3 and 4.

An enlarged section of the trunk is shown in Fig. 4, and a side elevation in Fig. 5. It will be seen that the

FIG. 5.

trunk is divided vertically into three sections. The top section, "C," through which the cotton passes to the breaker, is separated from the middle section by a grid surface, "B." The middle section consists of a series of pockets, or compartments, "A," into which the dirt and leaf settle as the cotton passes slowly over the grid. The bottom of these pockets, "D," is hinged at one side, the hinge being connected to a handle, "E," on the outside of the trunk, which is held in a closed position by a spring, "J." The lower section of the trunk, "F," is a passage connected to the exhaust fan, "L," by the pipe, "M." The bottom of the pockets open into this passage which is closed at both ends by the doors "G" and "N."

When it becomes necessary to clean out the trunk, which is done from two to four times a day, the feed on the opener is usually stopped. The fan, "L," is then started and the doors opened, (as shown by dotted lines), this producing a strong current of air through the lower section or passage leading to the fan.

The springs, on the outside of the trunk, which hold the bottom of the pockets in position, are pressed and release the handles, which rise into the position shown at "E'" in Fig. 5, and allow the bottom of the pockets to fall into a vertical position as shown at "D'" in Fig. 4. The dirt and refuse fall into the passage and are carried along by the air current and discharged into the dust room below. Every other pocket is usually taken at one cleaning.

Leno Weaving.

Continued from March.

Fig.9 illustrates another fancy leno. In this weave we have two single threads crossing a heavy cord; and the cord and crossing threads weaving five picks of plain, and then one crossing pick with six picks for repeat of

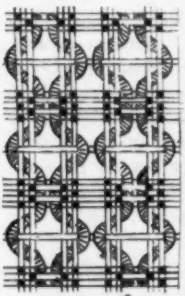


Fig. 9

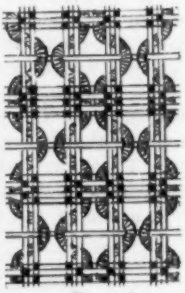


Fig 10

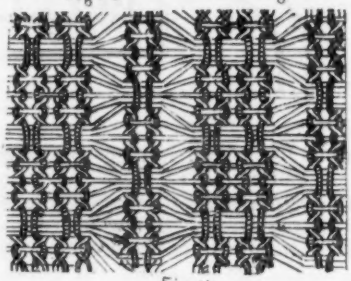


Fig. 11

pattern. This pattern and the one shown at Fig 10 are given to illustrate a point that we touch on in your issue of September, 1897. In that article we stated that it was always best when forming a diamond weave, to always draw the first cord into a left hand doup.

At Fig. 9 we have four cords drawn

in pairs, each pair working together to form a diamond. You will notice that the first cord is to the left of its crossing thread, and so must be drawn into a left hand doup. Now, on the crossing pick you see that cords open out to form the diamond, and then come together for five plain picks; the full sketch showing six diamonds. Take the sketch shown at Fig. 10 in this weave. The first cord is drawn to the right of its crossing thread, so must be for a right hand doup. You will now notice that the cords do not work in pairs, and on

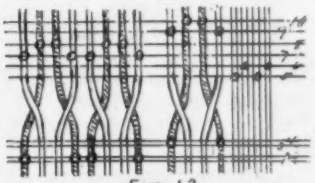


Fig. 12.

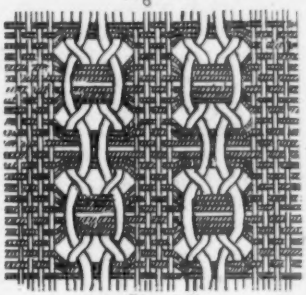


Fig. 14

the crossing pick instead of opening out they come together. The first cord being drawn into a right hand doup, and the last one into a left hand doup; it leaves the two centre cords to work as a pair, and so by this arrangement we only get three diamonds instead of six. If we should use this weave in combination with a satin stripe, the stripe would have to be woven face down.

Fig. 11 illustrates another fancy leno, and is also a pure gauze weave, for the doup threads are never left down for the filling to pass over them, and the crossing threads are never up for the filling to pass under. This weave is given on account of its effect very much resembling lace. It requires two sets of doup harnesses and the doups are tied in lefts and rights. The shaded threads represent the doup threads and are held up for five doup picks, then one crossing, one doup and another crossing pick, eight picks for repeat. Although the threads in the sketch are shown as beaming an equal amount it should be woven with two beams and the doup threads run with a looser tention. The drawing draft is shown at Fig. 12. Harnesses 1 and 2 front doup, 3 and 4 back doup, 5 and 6 selvage, 9, then 10 under 9 and through back doup (left hand), 10 under 9 and through back doup (right hand), 7, 8 under 7 and through front doup (left hand), etc. In drawing this pattern into the reed 9 and 10 go in one dent, then skip one dent, 9 and 10 in one dent, then skip four dents 7 and 8 in one dent, then skip one dent, etc. The chain draft for Fig. 11 is shown at Fig. 13.

The weave shown at Fig. 14, although nothing but a common full leno weave it gives a very peculiar effect, for we have to examine it some little time before we can make up our mind it is a leno at all. It will deceive most any one when woven with the warp and filling dark blue and the heavy cords white. As we examine the first doup and crossing thread, we see the doup thread to the left of the crossing thread, the doup thread is then passed to the right for six crossing picks, then immediately passed to the left for six doup picks, twelve picks for repeat of pattern, and we get a pure gauze weave.

The doups being tied in lefts and rights, and floating for six or twelve picks, and the two colors are what gives the effects.

The drawing draft is shown at Fig. 15. Harness 1 and 2 doup set, 3, 4, 5, and 6 for plain and selvage, crossing thread 7, then 8 under 7, and through doup (left hand), 8 under 7 and through doup (right hand). The chain draft is shown at Fig. 16.

We now come to the leno weave known as the "turn and a half leno," but, as we explained before, it is only a "full turn leno," for instead of the doup thread turning one and one-half

times around another thread it turns but once around, and also that it is not a practical weave, and is seldom used.

Fig. 17 illustrates the manner of tieing in the doup to produce this weave. You will notice that the two threads form a full, or open, shed. The doup is then passed around the lower thread (doup thread), then passed over the upper thread, then under the lower thread and fastened to the upper half

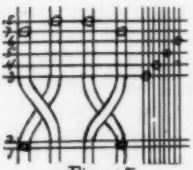


Fig. 15

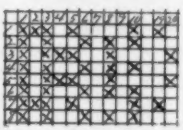


Fig. 13

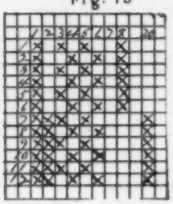


Fig. 16

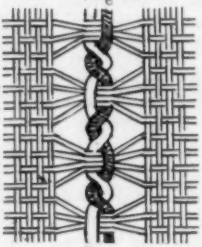


Fig. 18

Fig. 17

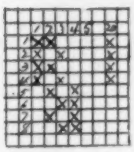


Fig. 19

of the harness shaft. We now have one shed formed with the doup thread down on the right side, and the other thread up on the left. The shuttle is then passed for any number of picks.

To form the other shed this half harness is raised, and at the same time the upper thread is lowered, both harnesses remaining down while the doup raises the doup thread for the shuttle to pass between as before. The slackner must also be raised on these picks. The two threads are drawn into their harnesses at the back as for ordinary weaving. On account of the extra length of doup we must get an extra large lift on the half harness so as to lift the doup thread high enough for the shuttle to pass between.

Fig. 18 is a sketch of a pattern woven on the above principles. You will notice that the shaded thread is always on the right side of the other thread, but is up on the first four picks, and down on the next four, and so makes a complete turn around the other thread. The chain draft is shown at Fig 19.

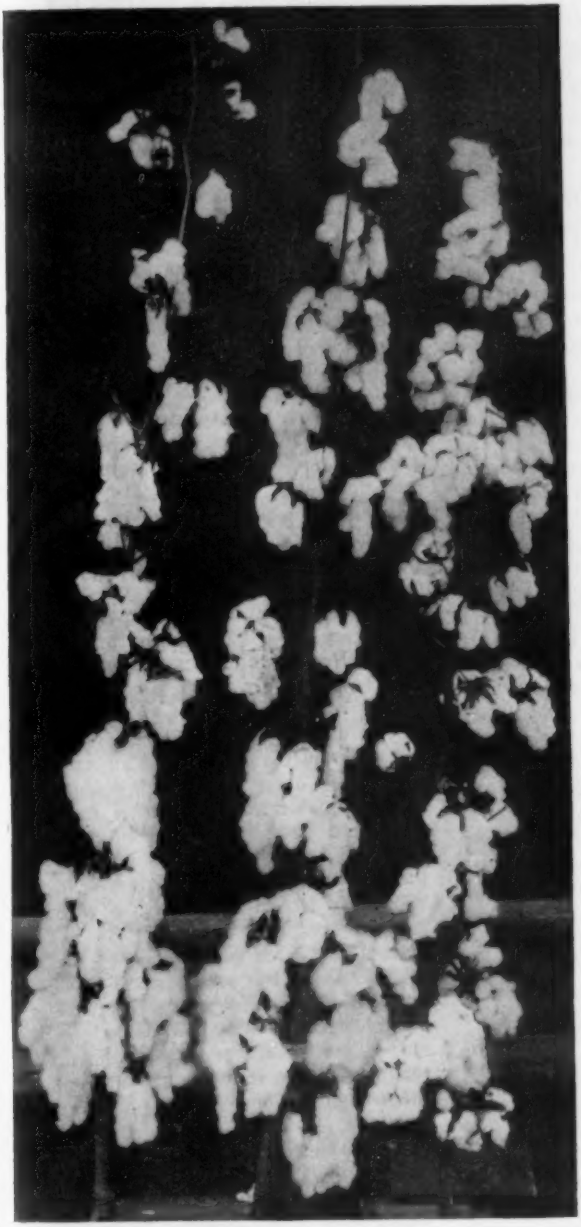
DOUP.

Jackson's Limbless Cotton.

A great deal has been written and said in regard to a supposed new variety of cotton, recently introduced into the South from seeds claimed to be obtained from the interior of Africa, with a fibre between an upland and a Sea Island in quality. This cotton has attracted additional attention as figuring in a recent case that was argued in the United States court, regarding the commercial use of a trade term, in which it is referred to. The case was known as The Jackson African Limbless Cotton Co. vs. J. C. Mayfield, in which the defendant was enjoined from using any part of the name, or the pictures, of the cotton, and from pretending to sell genuine African limbless cotton seed. Upon trial, the injunction was dissolved and modified to extent of conceding to defendant a right to use the pictures, the name, and the conduct of his business in the seed, restricting him in only one particular, and that, the use of the name Jackson in connection with his seed. The plaintiff's alleged trade-marks were held invalid.

We learn from those engaged in the case the following undisputed facts, that were developed during the trial. In the early fall of 1895, a Jew, named Kyle, turned over to T. A. Jackson, Atlanta, Ga., a small quantity of peculiarly shaped cotton seed, which he claimed to have brought with him from the Congo country of Africa. Jackson undertook to plant them, and to deliver to Kyle, or his assigns, two-thirds of the seed from that year's crop. Jackson and his two sons car-

ried out this contract with Kyle, and delivered to the assigns of Kyle, in the fall of 1895, about three bushels of seed, keeping for themselves something less than two bushels. The three bushels delivered to Kyle's assigns came into the possession of J. B. Stewart, who paid $500 for them. Part of the seed retained by the three Jacksons were planted by them in 1896, and parts were sold to W. L. Traynham and A. L. Holbrook, of Atlanta, who planted them and saved the proceeds. Other small sales of seeds were made by the Jacksons to different parties, in 1895, 1896 and 1897.



JACKSON'S LIMBLESS COTTON.

While the first crop was growing, in 1895, a visitor to the field of the Jacksons, applied to the product the name African Limbless cotton, which, because of its aptness and descriptive character, clung to it, and by that it has since been universally known. In the early fall of 1897, J. C. Mayfield began to collect seed from the Jacksons themselves, and from the various persons to whom the Jacksons and assigns of Kyle had sold the seed, in which effort he was seconded by the Jacksons, his purpose of course being to sell the seed at a profit.

In November, last, the older Jackson and a company of supposed-to-be capitalists, undertook to get all of the seed for themselves, but finding this impossible, they, in December, had their company incorporated under the name of the Jackson African Limbless Cotton Co., and registered as trademarks the name and a cut of three growing stalks of cotton.

Meantime Mayfield had gotten possession of large quantities of the seed, and the elder Jackson assigned to the newly organized company his entire stock, consisting of 54 bushels.

There are in existence at this time about 300 bushels of seed. The company named owns 54 bushels, J. B. Stewart owns 40 or 50 bushels, and a gentleman in Mississippi owns possibly 40 bushels, and the rest is owned or controlled by Mayfield.

It may be stated that those who testified at the time of the trial spoke in high praise of the quality of the cotton, and that, so far as the cotton itself is concerned, it is no freak or a fraud.

This cotton has attracted such wide attention through the South, in which the users of cotton in New England have become more or less interested, that we have thought it would be sufficently interesting to our readers to warrant an illustration of it, as we have done in connection with this article. The illustration of Jackson's cotton is made from a photograph sent us by Mr. Jackson himself. In connection with this, we have illustrated a variety of cotton known as "Welborn's Pet," to which allusion will be made. In order to show the character of the fibre and the length of staple, we have submitted the sample received from Mr. Jackson to some scientific tests, which we also illustrate.

There is considerable romance connected with this Jackson cotton, which will serve as interesting reading, if nothing more; and there is certainly a large amount of romance connected with the statements that have been published in reference to it.

One day in the autumn of 1894 a traveller, bronzed and bearded from the effects of the tropical sun and a long sea voyage, about 45 years old, robust and sinewy, signed "Adolph Kyle, England," on the hotel register at the Kimball House and ordered his somewhat cumbrous luggage carried to his room. He was soon surrounded by a crowd of curious colonels, who were anxious to learn what particular brand of spirits he affected, and, incidentally, something of his antecedents, and whether or not he had any spare cash to invest in suburban lots or mining schemes.

Partly through natural garrulity and partly through a desire to gratify the manifest curiosity of the colonels, he began to relate scraps of his adventures among the jungles of Central Africa and of the remarkable sights and scenes that came under his observation. He regaled them with hunting stories, tales of the slave trade, which made their mouths run water, and of the wonderful vegetable production of that region of eternal summer.

"In December, 1892, I joined a party of prospectors," said he, "and we set out on a tour of exploration to the country of the Congo. It was an arduous undertaking, full of perils and privations, but we were all young Englishmen who had started out to seek our fortunes, and we had all to win and little to lose, and for many months we wandered about the jungles of Central Africa, meeting with the savage tribes and passing through strange scenes innumerable, such as may be seen only in that wonderful land.

"One day along in 1893 we pitched our camp on the outskirts of an African village, about twenty miles south of the equator and 1,000 miles from the coast. I observed growing near the camp a thicket of enormous cotton plants, twenty feet and over in height, and covered from bottom to top with snowy pods and blossoms. It attracted my attention because of the abundance of the plant, which was limbless and bore its pods at the base of the big, broad, fig-like leaves and only a few inches from the stem of the plant, which shot straight up from the ground and appeared like a young tree.

"I tried to learn of the natives what use, if any, they made of it, but they seemed utterly ignorant of its utility. I had seen cotton growing in Egypt, and the similarity of the plants caused me to think to myself that if this plant could be introduced into a civilized cotton growing country, and

could be made to grow as luxuriantly and fruit as abundantly as it did there in the primeval wilds, it would make the fortune of the man who introduced it.

"I cut off a section of the plant that had more than six hundred pods on it by actual count, and was more than twenty feet in height. The section was about eighteen inches long and had sixty-five pods open on it, and I carried it away among my luggage as a curiosity. At first I carefully wrapped it in a piece of antelope skin and packed it among other souvenirs of our wanderings. We were then on the return journey to the coast, and on the way up we were upset in a turbulent stream by the overturning of a raft, and all our belonging were thoroughly saturated.

"In drying my cotton stalk I smoked it slightly, but I preserved it in a piece of dressed shark skin to protect it from the salt water and air on the voyage to the Cape. Arriving there I did not like the turn affairs had taken, so I resolved to visit America. The only relative that I have in the world that I know of is in the service of the Baffin's Bay Company, and I am now on my way to that part of the country in search of him. I inherited a little money, and having no home ties I have resolved to gratify my taste for travel.

"I noticed in travelling through this country that your principal crop is cotton. Now I have carried that piece of cotton for many months, and it has travelled 6,000 miles of land and sea, so that I doubt if the seed will germinate; but I want to give it to some good fellow, who will experiment with it and see if it can be naturalized in a cotton growing country, where civilized methods of cultivation are understood."

"There is a man living in this country who has devoted many years to the study of the cotton plant," said one of the colonels who had heard the story, "and he can tell you in a few minutes whether it can be grown in this country or not."

"Send for him and I will make him a present of the cotton," said the traveller.

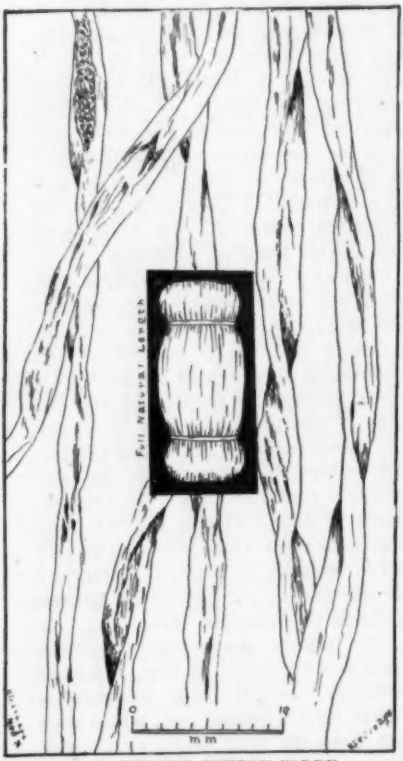
A note was dispatched to Thomas A. Jackson, who lives not far from the city, and on the next day he called on Kyle at his rooms in the Kimball. Farmer Jackson is an East Tennesseean, was an aide-de-camp to a Confederate general in the war, and left his native land because of the hostility of the Brownlow faction immediately after the war. He is a man of large experience in cotton growing, and has a liberal education and an inquiring turn of mind. He had been studying the history of the cotton plant for years, and as soon as he laid eyes on the withered stalk that had been carried so many miles he saw that it was of a different genus from the shrub cotton of South America or the annual plant of Australia.

He had a long talk with Kyle and, while the other colonels made light of the story, Jackson listened very attentively and finally carried off the dilapitated specimen to his poor little farm among the reddest of the red hills of Georgia. Carefully he picked the leaves from the silken locks of cotton, observing that many of the pods or bolls contained five cells each instead of four, which is the rule with the ordinary cotton. Out of the 265 seeds secured, fifty-seven germinated in the garden plot where he planted them in the spring of 1895.

The sturdy plants grew rapidly, each putting forth, at first, a pair of ordinary leaves, and immediately above them a second leaf, which grew out from the stem about two inches. Then followed a joint, at which a cluster of "squares" or buds appeared the leaf stalk continuing and terminating in a broad thick leaf, while the portion between the cluster of buds and the stalk thickened to the size of a lead pencil, forming a support for the heavy bolls. The plants grew to a height of twelve to fourteen feet, putting forth alternately the general leaf and the fruit bearing leaf, all the way to the top, and continuing in full foliage till the frost fell, except that the lower leaves dropped as the bolls

matured, so that by the time the cotton was open and ready to pick, the leaves had disappeared, leaving only the snowy bolls ready to be gathered, free from trash or plant stains.

The discovery became noised abroad, and cotton men from a long distance came to see it. Every seed was carefully picked out by hand, and in 1896 there were enough to plant half an acre, less thirteen



JACKSON'S COTTON FIBRE.

square feet, as measured by a cotton expert from Baltimore. The land composing Jackson's little farm is not at all adapted to cotton culture, and the farm had been conducted as a grain growing and dairying establishment for years. But from that half acre Jackson picked a little over 2,000 pounds of seed cotton. It was not carefully ginned, but it yielded 800 pounds of the finest lint cotton ever grown in Georgia, giving 40 instead of the usual 33 1/3 pounds of lint to the 100 of seed.

Coming to facts more within our direct line of inquiry, Mr. Jackson, in a letter to us, affirms that there is nothing like his new variety, as he regards it, in this country. He says that it grows from twelve to fourteen feet high, and yields about 40 pounds of lint cotton to 100 pounds of seed cotton, and grows on a straight stalk, perfectly limbless, averaging from 150 to 175 bolls to the stalk. The seeds are worth, in his estimation, one cent a piece, and there are about 180,000 to a bushel. The lint, he says, can be sold at twelve cents per pound. He writes that there are no imperfect seeds, but all the blooms are perfect, and are from ten to twelve days earlier than any other cotton grown in the latitude of middle Georgia, and appears to grow more from the humidity of the air than any other variety. His entire crop of 1896 was grown without any rain in the fruiting, or maturing, season, on common upland soil, without any fertilizer whatever. Under these conditions it grew eight to nine feet in height, and the season he considered particularly unfavorable. He says, that to make a successful crop of one acre of the staple, the plants should stand four inches apart in drill which will give 630 plants to a row, ten bolls to each plant, or a total of 6300 bolls to the row; and allowing 100 bolls to a pound, 63 pounds of seed cotton is obtained from a row, and 70 rows per acre will give 4410 pounds of seed cotton.

It is from this crop of cotton, and in connection with this advice from Mr. Jackson, that we received a sample of lint, which we subjected to a microscopic examination, as herewith illustrated. Of course, we cannot vouch that the cotton we received is a fair average specimen, either in quality or length of staple, but so far as the sample itself is concerned, it will be seen that the fibre is relatively fine, of excellent formation, strong and sound in appearance, and on the whole possessing superior spinning qualities, which should commend it to manufacturers. The length of staple, we found to be 1⅛ inches. The feel of the cotton is silky, and

approaches the Sea Island variety in this respect more closely than the average upland.

We greatly regret that we have been unable to obtain from Mr. Jackson any specimens of the capsules, or any of his cotton on the seed, or any portion of the foliage, which he promised to send us, but has not done so.

We have thus stated Mr. Jackson's claim, which is disputed by many good authorities, and none that commands more attention than that from R. J. Redding, director of the Georgia Experiment Station, Experiment, Ga. Mr. Redding has given these claims of Mr. Jackson most careful consideration, and has experimented with the seeds of this so-called new variety. In this connection, we might call the attention of our readers to a letter addressed to the editor of this magazine that appeared in our November issue, 1897. Mr. Redding does not dispute the merits of the cotton, although its commercial value has been largely overestimated. It is not the cotton, but the claims that have been set forth regarding it, as a new genus, or new specie, or new variety. He says that it is neither, and that it is nothing more than the cotton that is known as "Welborn's Pet," to which we will allude further on.

A number of tests of this cotton, with others, were made at the Georgia Experiment Station, and certainly the record of these tests is flattering to the value of the Jackson cotton, although it does not give it a rank superior to some others. In comparison with twenty other varieties, it ranks third in value of total products—lint and seed. The total yield per acre, in pounds, of seed cotton, is given at 1366. The number of seeds in one pound of seeds, 5159; pounds of lint per 100 pounds of seed cotton, 37.1; total pounds of lint per acre, 507. It will be seen that this record is a good one, and much better than the average.

Mr. Redding says that this cotton is not naturally limbless, but is inclined to produce several (often five or six) long branches from near the ground. When very closely crowded in the drill, however, many stalks will be without these limbs, and their normal tendency (as with cluster cottons generally) to grow tall is much increased. The stalks grow from 15 to 20 per cent. taller than most ordinary varieties on the same soil. On exceedingly rich soil, such as rich alluvial, or a very highly manured spot, they may attain a height of 10, 12 or even 14 feet.

Mr. Redding, in a report to the Department of Agriculture, Washington, says:

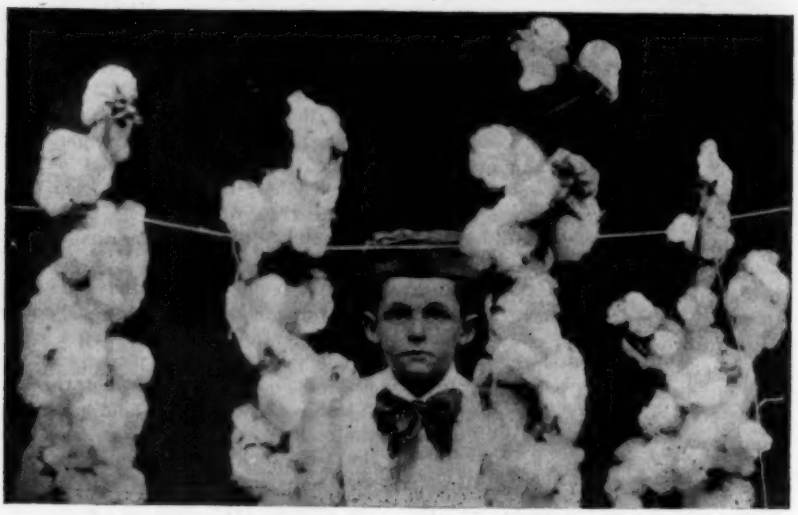
"The fibre (lint) is fairly good, but nothing extraordinary. It does not compare at all with Sea Island, Egyptian, or even with Allen's long staple, and would not command a higher price than the ordinary upland short staples. The fibre is not remarkably strong, and is not one and a half inches long. Its length is from one-half to three-fourths of an inch long, averaging about five-eighths of an inch."

The director visited and examined Mr. Jackson's cotton field, early last September, and estimated that a yield of one and a half bales per acre might possibly be secured with favorable future conditions. The land on which the cotton was growing has been under very high culture for years, and was heavily fertilized with fertilizers, the present year; and, in the opinion of the director, was capable of producing sixty bushels of corn per acre.

Mr. Redding says that this cotton is a fairly good variety on rich soils, or under high culture. Mr. Welborn says it is not suited to poor land and poor culture.

Especial attention has been called by Mr. Redding to this so-called "limbless," because of the extraordinary claims that have been made for it and the unprecedented high price asked for the seed. These claims are so apparently plausible, he says, that the unsuspecting and confiding farmer is liable to be induced to pay at the rate of over $200 a bushel for the seed, when the identical same variety of seed may be had for probably less than $2 a bush l.

The claims made by the promoters and exploiters of this variety are preposterously absurd and totally unsupported according to Mr. Redding, as shown by the results of the carefully conducted tests made on the station farm. To illustrate: It is called "limbless," but most of the stalks in the station test had two or more limbs, and some of them six and eight well developed "limbs." One in particular, which was planted apart from the main test in the "hybridizing" section and with plenty of distance, had eight long and strong "limbs" or branches.



WELBORN'S PET COTTON.

These stalks are just as they grew. The leaves all fell off before the cotton opened, as they always do. The string was used to hold the stalks in place.

Of matured and open bolls, the following are the statistics of that stalk. Main stem, 44 bolls; 1st branch, 12 bolls; 2nd branch, 19 bolls; 3rd branch, 1 boll; 4th branch, 10 bolls; 5th branch, 11 bolls; 6th branch, 13 bolls; 7th branch, 11 bolls, and the 8th branch, 8 bolls. Grand total, 129 bolls, of which there were on the main stem 44 and on the eight branches, 85 bolls. It will grow very tall, and without limbs, if closely crowded and any incipient branches be promptly pinched or pulled off, and thus be consistent with its name "limbless." But the results of the experiments indicate that the suggestion that this variety should be planted one stalk every three or four inches, in order to give the best results is totally fallacious. On the contrary, Mr. Redding believes that better results would be secured if a distance of 4 × 3 or 4 × 4 be given, provided, of course, the soil be rich. This would permit each stalk to attain a full development, including several long and fruitful "limbs."

Our readers have in the above statements the pros and cons concerning this cotton. It further appears that this cotton was the subject of discussion at the Interstate Cotton Growers' Association, held at Atlanta, Ga., last December, at which a committee was appointed to investigate and report upon it. This committee "unhesitatingly pronounced it to be the best variety of cotton ever grown in the South, that the plant is absolutely without limbs, and that the fibre is of a qualitiy superior to any thing grown." This committee was selected with an apparent purpose to report favorably upon the cotton as the chairman of it was the attorney and counsel of the Jackson African Limbless Cotton Co. One of its members, the editor of the Cotton Planters'

Journal, who signed the report in commendation of the cotton, has since come out in the Atlanta Constitution explaining his connection with the committee, and the making of the report, with a recantation of all the statements endorsed by him therein, and says that the committee was duped and packed.

From what we can gather, we should say that the object in view of the Jackson company, is to play upon the credulity of farmers, in obtaining money for seed, however meritorious, upon which the value placed is far in excess of its real worth.

In regard to the "Welborn Pet" cotton, which, it is claimed, with apparent truthfulness, is the same as the Jackson variety, we give the following reference to it, obtained from Mr. Jeff Welborn, Kerrs, Ark., in a letter to us.

The origin of "Welborn's Pet" cotton, is the cross of three distinct varieties, made in 1881 (Jones, Barnes, and Zellner). In Mr. Welborn's test patch, he found that the Jones variety came up in four days, while twenty-four other varieties did not come up until the sixth day, thus showing a more rapid growth before maturing, with large bolls. The Barnes, he found to be very dense, producing a green seed, and, as is natural in dense growing plants, the leaves were twice as broad and thick as other varieties, with the stalk very stout. The Zellner, he found to be a small, compact, close, limbless cluster, with very small white seeds, with only two leaves to the bunch of fruit, one leaf on the main stem, just where the first branch comes out. This branch runs out from two to six inches, on the end of which two to six fruit forms appear, with another leaf. This cross gave Mr. Welborn his ideal cotton, having the qualities of quick germination, rapid growth, hardiness, stout stalk, broad leaf, prolificness, rapid fruiting, clustering close around the stalk, without limbs, with a minimum of shade after fruiting begins, and early maturity.

The puzzle was could a cross apparently so distincly against nature be established? Mr. Welborn believed that if he could hold the cluster form with only two leaves to the bunch of bolls, and drop them off when the fruit was matured, that his ideal cotton would be established. Mr. Welborn was so well pleased with his efforts that he called his cotton "Pet," from his little son, whose picture appears in the illustration which we give.

COTTON SPINDLES IN ASIA.

A communication from a Shanghai correspondent to Ellison & Co., Liverpool, dated December 10th, 1897, gives the following interesting particulars as to the number of spindles in China and Japan:—

	China.	Hong-Kong.	Japan.	Total
Running	440,000	—	800,000	1,240,000
Erecting	75,000	50,000	350,000	475,000
Total	515,000	50,000	1,150,000	1,715,000

Besides the above, 4,300 more spindles are going to be added to the Yah Loong mill at Shanghai.

The following particulars relating to Japan are from official sources. The figures for 1897 are not yet available—cotton and yarn in 1000's of lbs.:—

	Number of Spindles.	Cotton Imported lbs.	Yarns Imported Bombay. lbs.	Yarns Imported English. lbs.	Yarn Produced. lbs.	Japan Yarn Exported. lbs.
1890	277,000	34,779	18,630	20,914	42,000	—
1891	353,000	66,838	6,064	17,052	63,818	—
1892	385,000	104,863	11,013	21,398	82,809	—
1893	391,000	125,114	6,495	19,380	88,527	420
1894	530,000	144,153	3,110	18,119	121,346	4,714
1895	600,000	191,291	1,790	17,665	153,000	4,706
1896	670,000	223,824	1,200	25,485	180,000	17,300

It will be seen that English yarn has fairly held its ground, but that Bombay yarn has been forced to retire. The Japanese yarn exported is chiefly to China.

Practical Cotton Designs.

Recently a good many figured cloths have been and are still being made with a raised back as in flannelette goods, the raised effect of course being done in the finishing and as such goods require special treatment of designs to obtain a good finish, a few illustrations and remarks will doubtless prove very beneficial.

Fig. 1 is a sketch for a cloth of this description which may be woven on any dobbie of sixteen shaft capacity, the weaving draft being very simple. In working out this sketch to obtain a good result, it should be made on a two and two twill ground, as by this means a great portion of the weft will be thrown to the back of the piece and will greatly facilitate the raised appearance of the cloth. It is obvious however, that the ground face of the cloth will be half weft, and as warp figures are very unsatisfactory in this class of fabric, and a partly weft face is also desirable, the ingenuity of the designer has to be brought into play to cause a weft figure to show out clear and distinct upon a groundwork where the weft is equally distributed on both sides of the cloth.

Fig. 2 shows the design worked out to give the necessary bold effect, the spots being so arranged that the largest floats of weft twill appear towards the centre of the edges of the spots and harmonize with them, the long floats being toned down by the smaller ones on each side; whereas if they occurred at the finishing end of the spots, they would give a very jagged appearance to them.

The draft is given at Fig. 3, and by a little skilful manipulation of the pegging or lifting plan at Fig. 4, many smart styles could be produced with the same draft. Cloths of this description are made with a very soft weft to give the necessary raised finish, a good cloth being made with 72 ends per inch of 1/20, and 60 picks per inch of soft spun 1/20.

Fig. 5 is a sketch for a fancy shirting which will prove an attractive pattern for the coming season, and should be made in a very light weight fabric suitable for the summer months. The openwork or mock leno, is introduced with a view to increase the intended lightness and airiness of the cloth, but at the same time the weave is sufficiently firm to prevent any looseness or slipping which would at once condemn it. The reeding of the openwork and stripes should be three ends in a dent and should be so arranged that in the openwork, the floating end should be the centre one

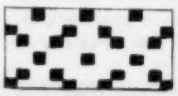


Fig 1

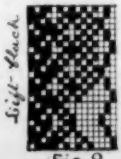


Fig 8

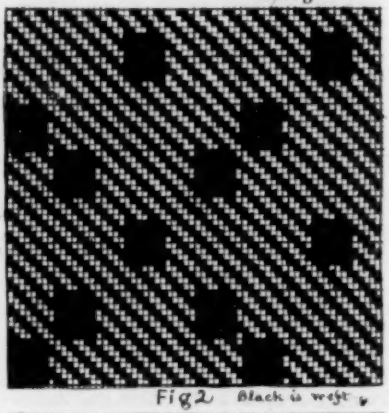


Fig 2 Black is weft

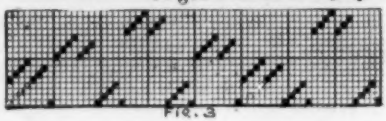


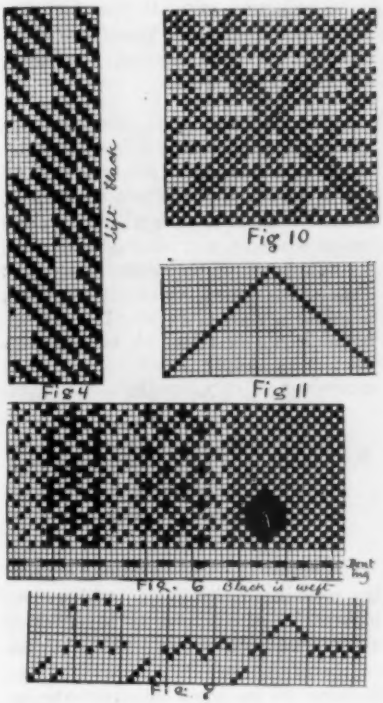
Fig. 3

of three in the same dent, the two outside ones being plain. The colored ends are extra, and only lift when figuring. An illustration of the design on point paper is given at Fig. 6 together with the draft and lifting plan at Figs. 7 and 8. Neat and simple fast colorings are the best for this style of cloth, although, if made in low qualities, would likely prove good sellers.

A sketch for a novel kind of cloth is given at Fig. 9, but to weave it as intended, two kinds of weft are necessary as it should be made with double al-

ternate picks of soft and extra hard spun weft, the latter being thrown to the back of the cloth where the figuring takes place. The hard spun weft will cause the figures to be puckered and drawn together, the effect being greatly enhanced when finished in the ordinary manner.

The design, which is a dobby style, is worked out in full at Fig. 10 and is very small, but more elaborate effects may be got by using the jacquard.



The draft shown at Fig. 11, and of which the first nineteen ends are the lifting plan, is what is known as the V, and with a skilful designer a good many other effects could be made with it.

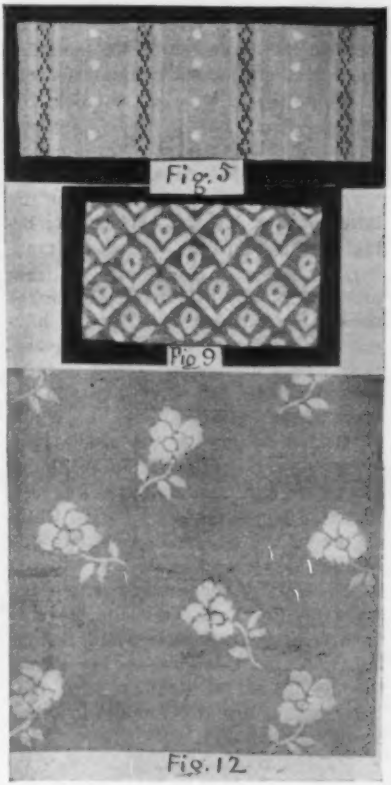
Fig. 12 is a neat sketch for a zephyr cloth to be woven in the jacquard, and is complete on 200 ends, and is intended to be worked up in any quality desired by manufacturers.

NOVELTY.

—Pacific Mills paid in 1897 $1,759,242 in wages, which is 22 per cent. of its net receipts.

Cotton Factory in the Interior of China.

A conspicuous example of the progress cotton manufacturing is making in China, is the recent establishment of a factory at Wuchang, on the Yangtsikiang, 400 miles from the coast. This advance of an industry, according to civilized and European methods, is of international importance, fos-



tered by European enterprise and capital. The successful establishment of cotton spinning mills in China is now an accomplished fact. An illustration of this mill is given in one of our foreign exchanges, together with interior views of it, showing the position and character of the machinery therein. The mill is, we believe, the largest cotton mill in the Chinese Empire. The whole building forms a compact structure, in shed form, all of the machinery being arranged on the ground

floor, with necessary divisions. The machinery comprises 21 double cotton gins; 5 large single openers, combined with single beater scutcher and lap machines; 10 single beater lap machines; 135 single iron revolving flat carding engines; 19 drawing frames, 3 heads of 8 deliveries each = 24 deliveries per frame; 11 slubbing frames, containing 94 spindles each; 19 intermediate frames, containing 126 spindles each; 34 roving frames of 160 spindles each; 149 ring-spinning frames; 133 frames of 336 spindles each. 16 frames of 332 spindles each, or altogether 50,000 ring spindles; 250 single 40-hank bobbin reels; 14 yarn-bundling presses; also hydraulic baling press, pumps, etc., complete.

The mill was set in operation the latter part of last fall, everything being completed in a satisfactory manner. It is stated that the yarn being produced at this mill is eagerly sought for by the Chinese, large orders having been booked for forward delivery. It will be a matter of interest to business men especially to note that in the short space of ten months the whole of the machinery in the above mill, comprising the preparation machines and 50,000 ring spindles, with the reeling, etc., was erected by native Chinese under the supervision of only one English erecter. The mill is situated in the heart of the country, about 800 miles up the Yang-tse-Kiang, several days steamboat journey from Shanghai, and the district does not afford the resources for dealing with machinery that are at command in other centres of industry.

—The quality of the scouring soap employed in cleansing yarns is a question of much importance.

—Most of the Japanese silk goods that find a sale in foreign markets, are woven in the huts of the Japanese farmers.

—Experience is practically the only school in which competency is acquired in cloth making, by which is meant the art of changing the counts of yarns, the setting and nature of the threads.

—To excel in the art of applying color to weave effects, it is necessary to be acquainted with the changes in cloth structure and textural design which may be obtained by varying the operations of the loom.

—When using dobbies there is always, more or less, a danger of the pegs in the lags not retaining the condition which obtained when first put on the loom. Sometimes they wear shorter; at other times they become loose and drop out. It therefore behooves the overlooker to pay particular attention to this matter, especially when weaving gauze.

—The city of Courtral, Belgium, has opened a conditioning house annexed to its Commercial Laboratory. The fees fixed for the different services of conditioning at Courtral are: Weighing of samples, 4c.; conditioning, 58c.; designation without conditioning, 20c.; designation after conditioning, 10c.; absolute designation, 58c.; feet by dynamometer, 10c.; feet by corsiometer, 10c.; microscopic examination, 48c.; measurement of yarns (by skeins), 10c.

Mechanism of a Fine Spinning Mule.

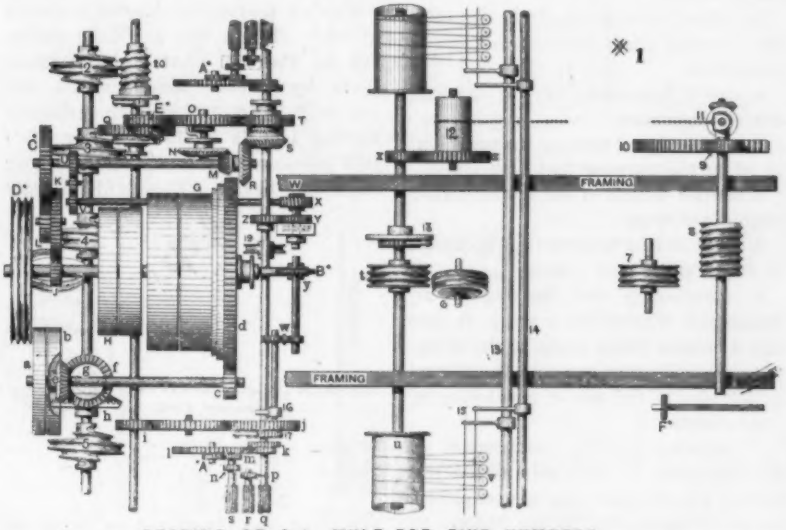
WILLIAM SCOTT TAGGART.

The spinning of fine yarns is a highly specialised business, which has hitherto been confined to Manchester district and one or two firms on the continent of Europe. At present there appears to be some considerable interest taken in the subject in America, and this is developing into practical attempts in several places to compete with the Manchester yarns. Fairly successful results have followed these efforts, and the near future will undoubtedly see increased activity in the direction of producing the finer qualities of yarn.

Numerous inquiries are being made as to the requirements for fine spinning: and in a few cases some experience has been obtained but only after a considerable loss of both time and money, and even then there is

something definite lacking in the results. As an aid to those who contemplate going into the fine spinning trade, or to those specially interested in the matter, the following notes may be of some value.

Fine spinning, it may be remarked, is somewhat of an indefinite term; many people would probably speak of a mill spinning up to 130's as a fine spinning concern, but when, say, 200's has to be spun on a mule that has been constructed to spin up to 130's, it will be found that many and great changes are absolutely necessary to be made in the machine if economy and quality are desired.



GEARING OF S.A MULE FOR FINE NUMBERS

Without entering into many of the circumstances surrounding the question of fine spinning, such as the cotton; preparing machinery; weight of slivers; hank rovings; drafts; humidity; etc., we will simply confine ourselves to the mule; reserving consideration of the other matters to a future article.

One very important factor that must not be overlooked in fine spinning is the length of time it takes to build a cop. If a cop is on the spindle too long it deteriorates considerably; it becomes dirty, and the yarn developes a fuzziness which is naturally a very bad feature. We find, therefore, that cops are made, as a rule, smaller in diameter and much shorter than usual. For somewhat similar reasons it is strongly advisable to have a shorter stretch as the counts go higher, to reduce the fuzziness, and to have the strains on such fine yarns less continuous.

It may be remarked in passing, that most mules for spinnig good qualities of medium counts, are supplied with mechanical details that were formerly only to be found on mules for spinning fine counts; this may be accounted for by the fact that medium counts are now spun of a much higher quality than they used to be. In place of spinning 150's single yarn and doubling it for 75's, to get a good yarn, it is now the practice to spin a single 75's equal in quality to the former doubled yarn. We will therefore only touch on such motions and details as are necessary for converting the ordinary mule into a fine spinning mule.

It is unnecessary to do more than point out as a preliminary that the long cotton used for high numbers is much weaker in the fibre than the shorter cottons, and a more delicate treatment is therefore absolutely essential. The longer fibres will permit

of greater drafts in the rollers. More twists are put into fine yarns, and owing to their delicate character the strains resulting from this must be relieved in some way; from this we may deduce that the twisting operation is one that requires a skillful and slow action.

Suppose that it is desired to convert an ordinary mule to spin fine counts, from, say, 150's upwards. The following changes would be necessary:

Shorter spindles.

Finer spindle points.

Slow movement of the carriage during spinning.

Increased revolution of the spindles for twisting when the outward run is completed.

A quick movement of the carriage during the run-in.

A double speed-driving arrangement to effect the purpose just mentioned.

A shorter length of stretch as higher counts are spun.

A short shaper to permit of a change in the stretch being made.

A drawing-up and backing-off arrangement worked by a strap, to permit a change being made in the drawing-up scrolls, and to avoid the abrupt action due to the use of a drawing-up cone clutch.

A winding motion, independent of the quadrant, to come into action just before the inward run is completed, to avoid snarls due to the change in the faller wires.

A faller motion to prevent the faller wires straining the yarn during backing-off.

The faller rods and back shaft to work on anti-friction bowls to respond instantly to the motions effecting them.

Alterations in the weighting of the faller rods, and if possible lighter faller rods and sickles.

A good sensitive governor motion for automatically working the quadrant.

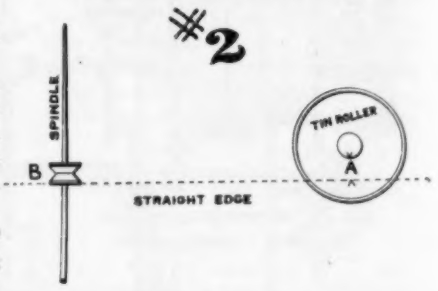
A good nosing motion.

Easily adjustable and positive roller motion, and gain and ratch motions.

We can now enter into the details mentioned, and give methods adopted for obtaining them. Before doing so a gearing plan of a fine spinning mule is illustrated in Fig. 1, and a word or two in explanation of it may prove useful.

Apart from the usual gearing it will be noticed that, instead of the generally applied drawing-up and backing-off by band, we have two strap-pulleys at "a" and "b." These are fast and loose pulleys. In a subsequent drawing it will be shown how the change is effected for drawing-up and backing-off through these pulleys. The scroll shaft is driven direct from pulley "b" without the intervention of a cone clutch.

Another feature to observe is shown at "H." Here a fast and loose pulley are on the rim shaft, and through them, by suitable arrangements, the rim shaft is driven (when the ordinary driving belt is on loose pulley "G") just previous to the carriage reaching the roller beam. This will be fully



explained and illustrated as the notes proceed.

The gearing at M, N, O is the jacking motion for gain and ratch, a more detailed drawing of which will be shortly given.

The roller turning motion is marked at U, K, V, W, X, Y and Z, and a roller turning motion whilst winding is shown at "I" and "J." Other parts of the mule illustrated are self-explanatory.

"A" is the change place for draft, 30 to 70 teeth.

"B" is the change place for twist, 40 to 120 teeth.

"C" is the change place for drawing out, 60 to 110 teeth.

"D" is the change place for speed of spindles, 9 to 21 inches diameter.

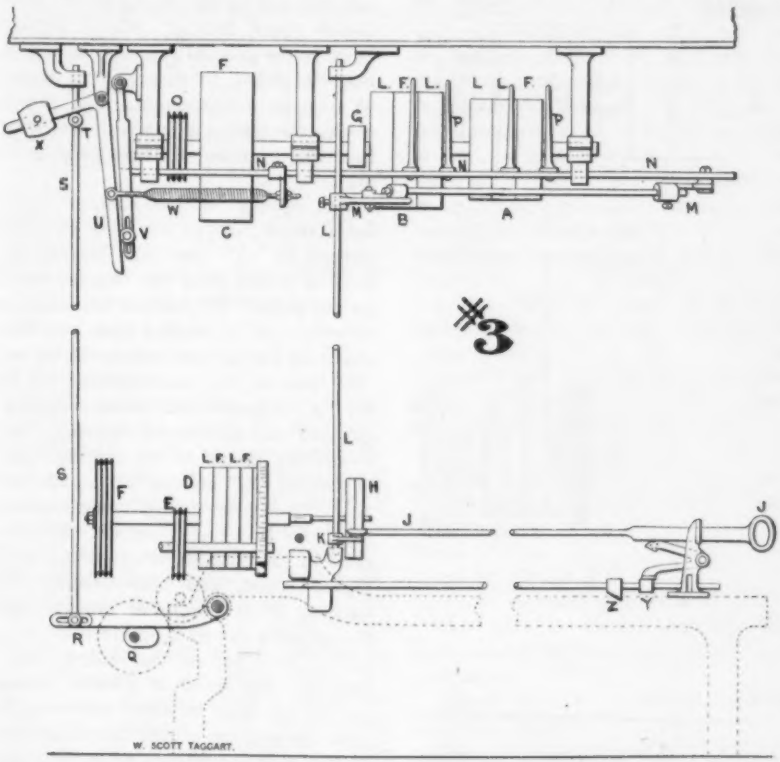
"E" is the change place for gain and stretch, 70 to 78 teeth.

"P" is the change place for gain and stretch, 16 to 20 teeth.

"F" is the change place for the shaper, 12 to 70 teeth.

Coming to the details, we will first mention the shorter spindles required for fine counts. A short spindle is a necessity because small cops are required, and it is, in the first place, advisable to have as little unnecessary weight as possible, especially in the spindles where the greatest proportion of power is always absorbed; and in the second place the cop should always be spun on the spindle as near as possible to the bolster bearing, with the idea of giving stability and preventing vibration.

The length of spindle would require to be about 14 inches long of which 6 inches would be above the bolster. The topping of the spindle would be about 3⅛ inches and the bevel as near 5½ inches as possible. There need be no difficulty in obtaining these dimensions if the mule is sufficiently modern and it is considered advisable to convert it to spin fine numbers. The spindle box would of course require to be bodily raised and to do this it must be detached and the necessary thickness of wood screwed on the top of the front of the carriage; the spindle box placed on this would occupy a correct position for all practical purposes.

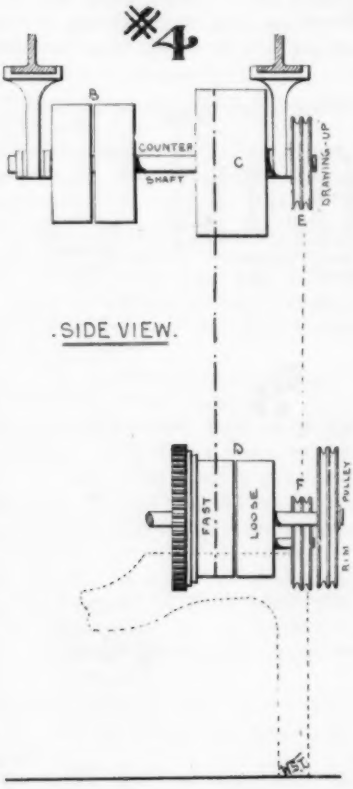


In regard to the wharve, the accompanying sketch, Fig. 2, will indicate the position it ought to occupy relatively to the tin drum. If a straight edge is placed on the underside of the wharve it ought to just touch the underside of the tin drum shaft, or for a

14 in. spindle, distance "A" must be 0
15 in. spindle, distance "A" " 3/16
16 in. spindle, distance "A" " 3/8
17 in. spindle, distance "A" " 9/16

The result of a long experience in

mules is represented in this small table. Its reason is almost obvious, for it will readily be understood that if the wharve is too high up the spindle, the band will press the spindle down on its footstep and produce friction sufficiently to add considerably to the power required to drive the mule.



On the other hand, if the wharve is too high up the spindle, the spindle will be lifted up and a dancing and vibration will ensue that will prove very damaging to the yarn and to the spindle.

The spindle point must of necessity be as fine a spossible, say 28's gauge. The reason for this is not difficult to understand. If a spindle point is say ⅛ inch diameter, every revolution will release over 3/8 inch of yarn and this being done say 9,000 times in 12 seconds, it is clearly seen that only strong yarn could stand such an action. By making the point, say, 1/16 inch diameter, the amount released is only a fraction over 3/16 inch, and in addition the strain is reduced during the run out by the slower revolutions of the spindles, this being an advantage because the gain in the carriage adds to the strain.

The slow outward movement of the carriage; the increased speed of spindle at the head, and the quick run in are obtained by an arrangement called double speed driving. Fig. 3 will illustrate the general practice, though it may be added, there are other forms of such an arrangement. Fig. 4 will enable the reader to compare this with the usual practice of single speed driving.

The driving of the counter shaft takes place through two sets of three pulleys at "A" and "B," whilst the mule is driven from the counter shaft by the pulley "F." When the mule is running out the straps from the line shaft are on the fast pulley "F" in set "B," and on the loose pulley "L" in set "A" respectively. Since backing-off can be performed quickly, the straps are moved to "L" on the right of the set "B," and to "F" on the set "A." This latter pulley being smaller than the fast pulley on set "B," results in the counter being driven at a higher speed, and consequently the backing off is completed quickly and the spindles run at a higher rate for a short time before the run-in commences. The speed of spindle during the run out may be about 4900 revolutions per minute, whilst they may run at 8200 runs per minute when twisting at the head. These numbers vary in different mills but the ones quoted are taken from very successful and recent mules spinning very high numbers, so that some confidence can be placed in them.

The actions are entirely automatic and are brought about by the mechanism shown in the sketch which is practically self-explanatory. To stop the mule entirely, the two driving-straps are moved on to the left hand loose pulley in each set "A" and "B."

WOOLEN DEPARTMENT.

Science and Practice of the Construction of Woven Textures.

FRED BRADBURY.

Continued from March.

With the particulars of warp and weft and compression as in the example given in the previous article, but having an angle of 30° formed by the weft, as at Fig. 18, let us determine the set, from one of the following constructions, and compare the altered condition with the former.

Hypothesis:

Diameter of warp = $\frac{1}{276}$ of an inch.

Diameter of weft in the direction of the warp = $\frac{1}{93}$ of an inch.

Diameter of weft at right angles to the warp = $\frac{1}{142}$ of an inch.

Cross section through the warp —.

Angle formed by the weft = 30°.

Construction:

Draw a straight line, "x y," of unlimited length; in "x y" take any point, "A"; with "A" as centre describe a circle equal to diameter of the warp; from point "A" draw a straight line, "A B," at right angles to "x y" an unlimited towards "B"; in "A B" select a point, "C," at a distance from the periphery of the circle circumscribing point "A" equal to the radius of the weft, in the direction at right angles to the warp. With "C" as centre describe a circle representing this diameter of the weft; from centre, "C," draw straight lines, "C D," "C E," unlimited towards "D" and "E," and parallel to "x y." Produce "C A" to "F" unlimited towards "F." In "A F" take a point, "G" equal in distance from "A" as "C." Through the point, "G," and parallel to "x y" draw straight lines, "G H" and "G I," unlimited in the directions, "H" and "I." Then "G C" is equal to one-half diameter of weft plus one diameter of warp plus one-half diameter of weft, each one-half diameter of weft being taken at right angles to warp.

Then from point, "C," draw a straight line representing the average inclination of the weft thread, and making an angle of 30° with "D C," and cuting the straight line, "G H," in the point, "M." From point "M" draw a perpendicular line with "G H" so as to meet "D C" in the point, "N." Then the points, "M" and "C," represent the centre of the weft thread in its highest and lowest positions respectively, and the distance, "N C," is equal to one diameter of warp plus one intersection of weft, or in other words to the distance which the centres of each consecutive pair of warp threads are apart, and the denominator of this distance in inches represents the number of tnreads per inch.

Proof: "MN" is equal to one diameter of warp plus one diameter of weft, since it equals, and is parallel to "G C," and between the same parallels, "H I" and "D E." "M N" therefore equals $(1 \div 276) + (1 \div 142) = 1 \div 93$ = Perpendicular. (N. B. The perpendicular is always oppo to the angle under consideration).

Perpendicular = M N.

Base = C D.

Hypothenuse = M C.

Let x = distance of base N C.

The base is always opposite the complement of the angle under consideration.

The hypotenuse is always opposite the right angle.

The three interior angles of any triangle are together equal to two right angles.

Tangent = perpendicular ÷ base = M N ÷ N C = $(1 \div 93) \div x$.

Tangent 30° = $1 \div \sqrt{3}$;

and $(1 \div 93) \div (x \div 1 = 1 \div \sqrt{3}$;

$= 1 \div 93x = 1 \div \sqrt{3}$;

$= 1 \div x = 93 \div \sqrt{3}$;

$= x^2 = 3 \div (93 \times 93) = 1 \div 2883$,

therefore $x = 1 \div 54$ nearly.

Cloth constructed according to the foregoing conditions would naturally contain 54 threads of warp per inch

and 63 threads of weft (diameter of weft in direction of the warp). The result indicates a considerable difference from the results obtained for the cloth constructed according to a previous diagram with the same warp and weft. Thus it is seen that as the angle of the weft is reduced the set decreases. The converse of this is also true, so that if the number of threads of warp are increased the angle formed by the weft must also increase.

It might be repeated here that the angle of 30° is selected as a minimum below which it would be unwise to go, because the piece would become too flimsy and loose, being necessarily constructed with fewer ends per inch,

Fig. 18

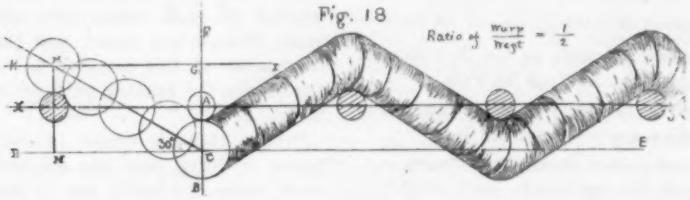
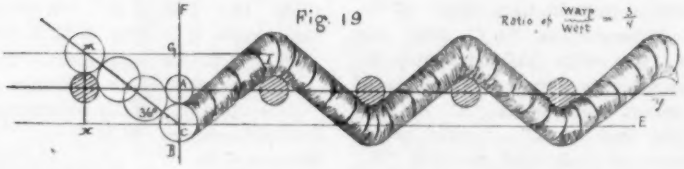


Fig. 19



without a corresponding increase in the weft. It is therefore very evident that we cannot construct or alter the construction of a cloth so as to increase its lustre, etc., by considering any of the foregoing, individually. Their relative effect must be considered collectively. However, the pressure upon the weft may be still further increased and so its reflecting surface would be increased without decreasing the angle from 30°. We shall then obtain a fabric which produces a slightly better lustre, and is more nearly in accordance with practice.

Hypothesis:

Warp 2/220s cotton, diameter 1 ÷ 276 as before.

Weft 1/20s mohair, diameter 1 ÷ 95 as before.

Amount of compression of weft ¾ the original diameter.

Angle formed by the weft 30° as at Fig. 18.

Increase in diameter of weft in direction of warp due to compression = (1 ÷ 95) + [(3 ÷ 4) × (1 ÷ 95)] = [(1 ÷ 95) + (3 ÷ 380)] = 7 ÷ 380 = 1 ÷ 54.28. Hence number of weft threads per inch = 54.

Let x = Diameter of weft at right angles to warp.

Then, letting "T" equal 22 ÷ 7, (T ÷ 4) × (1 ÷ 95) × (1 ÷ 95) = area of cross section of weft previous to compression, and T ÷ 4 × (1 ÷ 54.28) × x = area of cross section of weft after compression.

Then, since the area of cross section remains unchanged.

(T ÷ 4) × (1 ÷ 95) × (1 ÷ 95) = (T ÷ 4) × (7 ÷ 380) × x.

(2 ÷ x) = 4 ÷ 95.

Therefore, x = [(4 ÷ (95 × 7)] = 4 ÷ 665 = 1 ÷ 166.25.

And 1 ÷ 166 of an inch = diameter of weft at right angles to the warp.

The number of warp threads per inch may be found as follows:

Let x = distance N C.

Perpendicular M N = 1 diameter of warp + 1 diameter of weft = 1 ÷ 276 + 1 ÷ 166 = 1 ÷ 104.

Perpendicular ÷ Base = Tangent = (M N) ÷ (N C) = (1 ÷ 104) ÷ x.

Tangent 30° = 1 ÷ √ 3 = (1 ÷ 104) ÷ (x ÷ 1) = 1 ÷ 104x.

Multiply across.

104x = √ 3 ÷ 1

$x = \sqrt{3 \div 104}$

$x^3 = 3 \div (104 \times 104) = 1 \div 3605.$

$x = \sqrt{(1 \div 3605)} = 1 \div 60.$

The number of warp threads per inch natural to the foregoing particulars equals 60.

Experience has taught the writer that a fabric made according to such conditions would produce a texture which cannot be said to be unsatisfactory, inasmuch as its beauty would be enhanced at only a slight cost of its structure, but the improved beauty or lustre more than balances any objection in its structure, i. e., in the reduction of the warp threads without a corresponding increase of weft threads by reducing the angle of 45° to 30°.

If the weft is made to produce an angle of from 35° to 36°, and the diameter of the weft in the direction of the warp is increased by compression from one-half to three-fourths its original diameter, the results obtained not only produce very satisfactory results, but coincide with the production of some of the best fabrics of the foregoing description, that have ever been placed upon the market.

I make this assertion after a careful analysis of several makes of cloth of this character, of which the following is an example:

Counts of warp 2/100s cotton; diameter $= \frac{1}{188}$ of an inch.

Counts of weft 1/ 24s mohair; diameter $= \frac{1}{83}$ of an inch.

Woven in 56 threads per inch in loom.

Woven in 60 picks of weft per inch.

Finished 60 ends per inch.

Finished 60 picks per inch (actually 60 to 61).

Peripheries of weft, when woven or in gray, do not touch each other, but after the pieces are finished and the weft is compressed they do actually join close up to each other. From this we can very easily determine the amount of compression of the weft, etc., thus:

(1.) To find the diameter of the weft in the direction of the warp: Since the finished fabric contains 60 picks per inch, and since the threads of weft are compressed so that their peripheries naturally touch each other, their individual diameters in this direction consequently equal $\frac{1}{60}$ of an inch.

(2.) Let x = the diameter of the weft in the direction at right angles to the warp.

(a.) Area of cross section of weft before compression $= (T \div 4) \times (1 \div 95) \times (1 \div 95)$. (Equation 1).

(b.) Area of cross section of weft after compression $= (T \div 4) \times (1 \div 60) \times x$. (Equation 2.)

Then, since the area of both cross sections remains unchanged (proved), equation 1, and equation 2, are equal to each other.

$(T \div 4) \times (1 \div 95) \times (1 \div 95) = (T \div 4) \times (1 \div 60) \times (x \div 1)$.

Multiply across.

$95 \times 95\, x = 60 \times 1$ and $x = 60 \div (95 \times 95) = 12 \div 1805 = 1 \div 150$.

(3.) Let x = the amount of compression. Then $(1 \div 95) + [x \times (1 \div 95)] =$ diameter of weft in the direction of the warp. (Equation 1.)

Also $\frac{1}{60}$ (proved) = diameter of the weft in the direction of the warp. (Equation 2.)

Hence equation 1 and equation 2 are equal to each other. $1 \div 60 = (1 \div 95) + [x \times (1 \div 95)] = [(1 \div 95) + (x \div 95)] = (x + 1) \div 95$.

Mutiply across, and

$60x + 60 = 95 \times 1$

$= 60x = 95 - 60 = 35$

and $x = 35 \div 60 = 7 \div 12$. Amount of compression of weft.

Further, upon referring to Fig. 19, we observe that the perpendicular "M N," equals one diameter of warp + one diameter of weft (at right angles to the warp) which, in this case, respectively equal $(1 \div 188) + (1 \div 150) = (1 \div 83)$.

We have previously shown that the finished cloth contains 60 threads per inch, therefore the distance of one diameter of warp, plus one intersection of weft $= \frac{1}{60}$ of an inch = base "n c."

(4.) To find the angle formed by the weft, we proceed as follows:

Tangent of any angle = Perpendicular ÷ Base = M N ÷ N C = $(1 \div 83) \div (1 \div 60) = 60 \div 83 =$ 0.72289.

When the numerical value or trigonometrical ratio of the tangent of an angle = 0.7229, or 60 ÷ 83, as above, then the angle = 35° 52′, or approximately 36°.

Therefore, the cross section through the warp illustrated at Fig. 19 shows the angle which is formed by the weft to be one of 36°.

The construction of this figure is exactly the same as for Fig. 18, except that the line "M C" makes an angle of 36° with "D C" according to the above calculation, instead of 30° as previously shown in Fig. 18.

We have shown very fully, and clearly how it is possible to determine any angle which warp and weft form relatively with each other, together with their effect upon certain kinds of fabrics.

These important principles will next be reduced to simple formulæ for the benefit of those engaged in the manufacture of woven textures in which the angles, etc., play an important part, and we shall also apply our knowledge of this subject to the manufacture of other fabrics which are of equal, or even more, importance than those already referred to.

(To be continued.)

Selvedges.

Selvedges on the woolen fabric, and indeed on all fabrics, serve a two-fold purpose. One of these is esthetic in its nature, the other is utilitarian. Neither feature of the selvedge can be neglected without serious loss to the piece, and consequent disadvantage to the manufacturer. To understand the full significance of the selvedge we will have to go somewhat into detail.

The observer who enters a wholesale house, or even the tailor's establishment, cannot help but notice, as he looks at the pieces of woolen cloths in rows and piles about the shelves and counters, the selvedges of the goods. If the observer looks more closely, takes a piece in his hand, and unrolling it, holds it up to view, then, even more than before, the selvedge makes its impress upon him. We would be slow to assert that the observer is always conscious of the appearance and presence of the selvedge. This will depend largely upon the success in its manufacture and construction. But whether conscious or unconscious, its impression and its general effect is a matter of considerable reality.

A buyer takes up a piece, and looking at it, makes up his mind that he does not like it. He does not know just why. If he were asked, perhaps he could not without some thought give his reasons. But on considering the matter thoroughly it would finally appear that the selvedges were the feature that caused the note of discord. Unless a man is a technical man, unless he has some interest at stake, he will hardly even consciously observe the selvedge. But this does not destroy the truth of the fact that selvedges, when properly made and finished, go a long way to enhance and beautify the general effect of the goods. On the other hand, any observer, even the most casual, will admit that a poorly made, badly colored, miserably finished selvedge is a positive detriment to a piece of cloth from start to finish. The true result of the use of a selvedge so far as the esthetic feature is concerned, should be a condition of perfect harmony and accord between the selvedge and the body of the goods. If the selvedge is really correctly managed it will have the double effect of setting off the beauties of the cloth, and of not attracting conscious attention to itself. To do this and do it well, requires no little amount of skill and judgment.

So much for the esthetic side of the use of the selvedge. As to its utilitarian purpose, we all know that it is so made that it will serve to protect the outside edges of the piece. It is strong enough to hold the outside warp threads firmly. Without the selvedge, the continual pull on the outer warp yarns by the filling would curl them over or under on to the body of the cloth, and thus make an exceedingly poor finish, or no finish at all, at the edges of the piece. In the finishing department there are many processes that could not be satisfactorily undergone upon the whole face

surface of the piece, unless the selvedge was there to support and strengthen the edges of the goods. In these ways the selvedge becomes a very useful and indispensable feature.

While we may say all the above regarding the two-fold purpose of the selvedge, it may be further remarked that it is a mistake to suppose that the selvedges can be neglected in any way without harm and injury to the cloth. Personal experience has shown that there are some finishers who do not have the right idea regarding this apparently trifling part of the work.

Let us never forget a point of vast import in connection with this whole question; and that is, that a correctly made selvedge, one which fulfils both purposes, as explained above, and does it completely, is an indication of a carefully managed mill; and if we know that the mill is well managed, we have at once a good recommendation for the mill's output. Look at this assertion in the light of its opposite extreme. You take up a piece of cloth; the selvedges you at once observe are chopped and wrinkled, turned in and worn away, badly colored and badly woven. The natural inference is, at once, that that cloth was made by a careless overseer, turned out by a shiftless finisher, and probably indicates a mill which is managed with looseness and laxity. In the vast majority of instances, where such a state of affairs exists, or where the selvedge has had to be trimmed off because it was not presentable, you will make this most natural inference regarding the finisher and the mill itself. The question of correct selvedges thus becomes one which may well demand attention.

The next question that naturally follows as to the purposes which the selvedge is intended to fulfill, would be one connected with the manufacture and management of the selvedge itself.

To be a useful selvedge, it is necessary, generally, that it be made of a heavier yarn than that of the goods, and also perhaps that it be so constructed that its weave shall be closer and more solid and compact. If this is attended to, it will have the desired effect of keeping the edges of the piece straight, smooth and workable. If the cloth happens to be of a heavy grade, it is customary to employ only plain selvedges, and usually of the same stock and weave as that of the fabric. It is possible by merely interlacing the selvedge yarns with the yarns of the cloth to make a desirable and serviceable selvedge for heavy fabrics. If the goods are light weights and fancy weaves, the procedure, from the nature of the case, must be different. To use the same material, colors, and weave, would not be out of the question, and so the most workable selvedge is one of heavier yarns woven in basket weaves. As to color, the great thing is to determine on a color which shall add to the appearance of the whole fabric, either by a pleasing harmony or an agreeable contrast. The important design of the selvedge, so far as the beauty of the piece is concerned, is only attained when in color, width and weave, the selvedge adds and does not detract from the general effect of the whole piece.

The ingenuity of the finisher is constantly taxed in handling selvedges. Even a good selvedge may be injured and damaged by careless work in the finishing department. The pulling, even when selvedges are tacked or sewed together, may tend towards twisting or curling them in. The application of soap or of friction may give rise to this trouble, or the difference of stock in the selvedge from that in the piece may have much to do with bad work along the selvedge lines. If the body of the cloth shrinks less readily than the selvedge, tight selvedges will prevail. If the opposite is the condition, then the selvedges will be loose, and either condition is bad enough. This latter is very apt to be the case if cotton is employed as a selvedge material. These irregularities, wherever they are found, will require all the care and skill the finisher can command to keep them from injuriously affecting all the after processes. A tight selvedge works meanly at the gigs, sometimes getting

so much more work than the body of the goods, that it is entirely worn away. The loose selvedge hangs and rags so much that it gets into the shear blades and is clipped and chopped out of all form and serviceableness. In both cases the pressing cannot help but enhance the trouble already existing.

The fact of the matter is that about all the finisher can do is simply to struggle along as best he can when he gets hold of a bad line, and then always keep an eye to the stock, weave and condition of the selvedges as they come to him, so that any serious deviations may be rectified in the making. Happy, indeed, is the finisher who labors under a manufacturer who fully appreciates the necessity of a good selvedge. MANUFACTURER.

Beavers.

The finishing of beavers, like most other face finished goods, presents many points of interest which, to say the least, are worthy of special attention. The low grade goods of this class are by far the hardest to finish and we will therefore devote ourselves to the consideration of this kind.

Low grade beavers almost always imply cotton warp either wholly or in part, and usually quite a considerable percentage of cotton in the filling, and for this reason the satisfactory finishing of the same, becomes one of the most difficult problems the finisher has to grapple with. The production of sufficient lustre becomes quite a serious item for the one who has to furnish it for the finished fabric and no doubt too much is often expected of the finisher in this line. To produce a lustre on low grade goods, where there is no lustre inherent in the fibre of which the fabric is composed is quite a hard matter, and if too much is not asked in this line, it may perhaps be produced if all due care is taken and plenty of work applied at the right time. It is to this point that we wish to call special attention and show how a little extra labor rightly employed may work some astonishing results in the finished fabric.

As the foundation for a good finish on face-goods is always laid in the fulling mill, great care must be taken that this part of the work is rightly performed, and to this end we must turn our first attention to the proper making of the soap. While the soap should be of good quality care must be had not to have it too heavy; that is, the amount of hard soap to be used should be considerably less than we would use on all-wool beavers. Red oil soap which is often used on these goods is not fit to be used and when the matter is properly investigated there is no saving made in the use of this soap, as is often thought by those using it, but a good palm oil soap is the thing to use. It is as cheap as any for the service rendered, and in every way is better fitted for the work. The feeling of the goods is materially enhanced over what it would be if red oil soap be used. Cotton seed oil soap is preferable to the latter although not near as good as the palm oil. Tallow or tallow chip soaps should not be used for the reason that the removal of the soap from the goods is too hard to accomplish.

If palm oil is used, we should be careful not to have the body of the soap too heavy, and should not use above two ounces of hard soap to the gallon. The strength of the soap on the other hand may be made a little more than the average, for the reason that low stock usually is accompanied by considerable grease and other foreign matter which the alkali of course is expected to remove. Have the soap strong enough to properly cut all the grease on the stock, and after all this and other foreign matter is once properly cut and has become one with the soap, we must keep close watch that the whole does not become exhausted and thus set the grease again.

By adding a trifle of fresh soap now and then, taking care not to get the goods too wet, we may be sure that everything will be in the right condition for removal in the washer when the goods come from the mill.

In finishing these goods we are deprived of one way to make weight,

that is by shrinkage, for these goods as well as all cotton warp face goods depend upon the total covering of the cotton as one of the important points towards a good face. If we should set these goods up in length the cotton warp would be forced to the surface and no matter what we should do after, we would have a speckled and motley looking face, which would be made worse by the steaming the goods receive, for the cotton will certainly not take the same lustre as the woolen stock, no matter how poor this might be. So then, having this means of making weight taken from us, we will have to fall back on flocks as the means to regulate this matter. As we have only the filling to deal with, to which to apply the flocks, it becomes at once apparant that unless the filling is very good, which on low grade goods is out of the question, the flocks should be of very good quality. Only flocks which possess the felting property to a large degree should be used and then they will adhere to the goods in good shape and not sift out at the first handling the goods receive after they are dry. We must not forget that judicious flocking is of benefit to the goods, but let the process be ever so judiciously performed, if the flocks are not what they should be all the labor goes for naught and had better be left undone. Given the right kind of flocks the next question which arises is the proper application of them to the goods.

As it has been often said before, so now here, there is no use to try and flock goods until they become warm, for it is not till then that the felting begins. Unless the amount to be applied is very large the flocks should be put on the goods as soon as they become warm, and if possible in small quantities at a time. This is all the more readily done as the goods run long enough in the mill to give plenty of time for it. As soon as the flocks which have been applied, are absorbed by the goods and seem to adhere to them another small supply should be added and so on until all the flocks are put on which are required. This naturally takes care and time which we are not always willing or able to bestow, but if we want to produce a well-finished piece of cloth this fact cannot be successfully overlooked. On low grade face-goods this is one of the most important points to remember, and is the very foundation of an acceptable piece of cloth.

After the fulling has been properly performed, we come to the scouring or washing. This should not be more than a rinsing process, but for all that it should be thoroughly done, for we must always bear in mind the lustering process which is to follow later on, and it will not do to slight these goods in the least, for every shortcoming here is sure to show up to disadvantage when the goods are finished. Use plenty of warm water to first get all the dirty stuff out of them and follow this up with a generous supply of cold water to make sure that every trace of soap is removed. It will not pay to stint the goods in the washer. When the goods are clean they are tightly rolled up and laid down flat to drain. If goods are heavy, that is, if they weigh over 25 ounces, it will be best to slightly extract them before rolling, as they will not drain sufficiently over night to make them in fit condition for the gig. Now in this, we find another point which should not be overlooked on these goods, as well as on all face-goods, and that is to give the goods all the time you can on the rolls and have them wound as tightly as possible. This will impart a smoothness to the goods which can not be got in any other way. Of course this makes it necessary to have quite a large amount of goods in the wet state, but they require time to get them right. The gigging on these goods should be all one way for the very reason that we have to save all the fibre that we possibly can, and if we reverse the goods at all we will sustain a heavy loss of fibres which means a so much poorer face. We should go slow to commence with, using old work and

when about half done the goods are cropped pretty well down, but not too low, and should be given runs enough to even the fibres up in good shape. We then use sharper work, but at no time should breakers be used if it can be avoided.

After finishing the goods on the gig they are taken to the steaming machine and given a thorough steaming. Ordinarily one steaming on each cylinder is sufficient, but on these goods we find that two and even three steamings on each cylinder are required to produce the desired lustre. This can best be determined only by experince and this should be the guide. After the steaming they are ready for the dye house, and as they are both cotton and wool dyed at this place, the usual speck dyeing process, after coming back from the dye house, can be omitted. The goods are now taken to the wet-gig and given a thorough wet gigging. Wet gigs should be clothed with wood fibre brushes and not with worn out teasels, for the results will be much better and streaks will be avoided. Plenty of water should be used on the wet gig and six runs are none too many for good results. They should again be tightly rolled up and left over night before extracting and drying them. If they have been properly cropped the final shearing will not be a very elaborate process, but for a good effect runs should not be stinted, and as many be given as time will permit. The raising brush should not be applied too hard, as this will only tend to roughen the face and can do no good. Plenty of brushing with steam, both before and after pressing, will bring the goods to that condition which will make them salable.

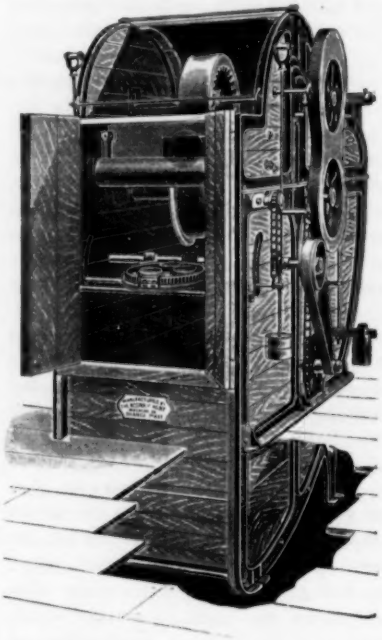
REAUMUR.

—When defects are found in cloth, the cause of which can be traced to any irregularity in a preparatory process of the warp, it is advisable to point out each individual case to the responsible person, in order to prevent repetitions of the same kind.

Rotary Fulling Mill.

MADE BY THE RODNEY HUNT MACHINE CO., ORANGE, MASS.

This mill is made from new patterns throughout, specially designed and adapted for the Balbian Patent System of Fulling, the essential and important improvement being the revolving guide rings through which the goods are drawn by the main squeeze rolls. These rings are made of brass



and are bolted to the cogged disk, which is kept revolving, and each string of cloth is constantly turning and changing position from side to side, preventing wrinkles and streaks, and the goods are fulled exactly alike and felted evenly. The soap is thus applied evenly and all cloudy effects are prevented, and needs no attention after the soap is on the piece until finished. All pieces are finished alike and at the same time.

The slow movement of the revolving rings keeps the goods open and they do not catch up or become twisted. A simple and reliable stop-motion arrangement is secured in connection with the ring device, which stops the

mill instantly in case of knotting, although knotting of the goods is almost wholly prevented by the revolving rings.

The form and capacity of the mill are especially designed for the best results from the revolving rings. Fulling, in from 20 to 40 per cent. less time than without them is claimed, according to the kind and form of the mill. A single set for three strings, like the cut, can be used, or a double set for six strings, as desired. The improved crimping box, for fulling in length can be controlled and retained at any desired pressure.

The main squeeze rolls have cast iron centres which can be covered with wood, presenting grain ends to the cloth, or they may be covered with brass, or rubber, as desired. The rolls have side flanges of brass usually, although the plain wide faced rolls are often preferred. The wood faced rolls have each piece of wood firmly keyed and a circular collar covering ends of keys on side of rolls. There is provided any style of mouthpiece desired for conducting the cloth to the rolls. The cut represents the mounthpiece made of wood and arranged to adjust from outside of mill, and conform capacity to weight of goods and number of strings. The makers also furnish the adjustable, upright rolls, made of lignum-vitæ, or of finished cast iron, plain or fluted.

The mill frame is made of cast iron and the casings of best Georgia hard pine, and like all machines made by this company, every part is made in the most thorough manner. The location of side flanges for supporting mill on the floor may be varied up or down and front doors made with more or less opening. Friction clutch or tight and loose driving pulleys are provided as preferred. Stretching attachments and other devices for special work are also provided when desired.

These mills are made in two sizes. Number one is three feet wide for three strings and number two is four feet wide for six strings, between the casings.

Knit Goods Men Dine.

The National Association of Knit Goods Manufacturers, which was organized about a year ago, was to have held its first annual banquet on March 30 at the Waldorf-Astoria. A large number of invitations were sent out to prominent members of the trade, and a good attendance was assured.Among those expected to be present were Charles E. Russell, of the Ways and Means Committee of the House of Representatives, and also a member of the Sub-Committee on knit goods schedule; W. P. Brownlow, of Tennessee, author of the bill to establish a Department of Commerce and Manufacturers, who was expected to speak on that topic; Wm. Harper, of the Philaldelphia Museums, who was to discuss the the extension of foreign trade. In addition a member of the Senate Finance Committee was expected to speak, also Local Appraiser Wilbur F. Wakeman. H. W. Bible Secretary of the Association, had charge of the arrangements. We regret not being able to give a better or more complete report, as the banquet occurs at a time when this magazine is in press.

Artificial silk, produced from nitrocellulose, has the well-known disagreeable property of losing about 90 per cent. of its strength in the wet state, whereby great difficulties in dyeing are caused. According to a recent patent this defect can be obviated by either adding 15 per cent. of formaldehyde to the solvents used in the process of manufacture, or by treating the finished thread with this reagent.

—The "Japan Herald" states that Japan cotton yarns are better in quality than Bombay spinnings, although this is not generally known in the interior of China. They were first shipped to China as a substitute for Bombay yarn during the plague, and the excellence of their quality has become to be understood by the Chinese. They are also slightly cheaper.

KNITTING DEPARTMENT.

The Knit Goods Situation.

The remarkably balmy weather of early March brought out the best trade on hosiery thus far this year. Underwear has not been as fortunate, but a single warm day has proved sufficient to show the trade in reserve. Taken altogether the outlook for spring, summer and fall is at least that of an average year. From now on weather is the principal factor. Manufacturers are showing some hesitancy over the slumps in the stock market, caused by the war scare, and the approach of warm weather seems likely to give the New Bedford strike a new lease of life, particularly as the operatives at other centres have gone back to work and can consequently aid the help of the whaling city in prolonging its struggle.

Some months we get so much conflicting testimony from various houses that it is hard to put the whole together and deduce a conservative general opinion. This month, however, we get substantially the same story from four of the oldest and largest houses in the trade and naturally infer that it is a waste of time to press further, looking for dissenters.

Buying has not been heavy since March 1, but in hosiery, particularly, the sales have been eminently satisfactory, measured by the past. But more important, in this connection, is the fact that a large part of the trade has been clear gain. The trade has worked more or less around the edges, but a certain number of duplicate orders will be forthcoming, while many a buyer's eye has been caught in this forced visit of purchasers for seasonable needs. In short, it gives jobbers two chances at the same man, instead of one, and he profits by it. Most firms seem to be banking on trade which will fully equal that of last year, but scarcely more.

Mills have not been so generally employed as they are now for a long period. Little is heard about cancellations, and prices are well maintained.

The most interesting gossip is over the hosiery counters. Fancies are in increasing demand and orders on anything like desirable goods are being filled by piecemeal. "They go like hot cakes even in staid New England," says one dealer. It is hard to believe how many men and women,—for men, where they buy fancies, choose even brighter styles than women,—are wearing plaids or some modification thereof. This in the case of women, because many of the fancy socks have black feet and so do not add to the rainbow aspects of windy, muddy, and rainy days. It is difficult to believe the statement of several houses that the introduction of fancies has not cut into the demand for staple blacks, but it is doubtless true that the fancy trade has largely been adtional. Sooner or later hosiery in roman stripes is sure to be shown, but not until foreign manufacturers are able to fill the call for plaids promptly. Buyers at Chemnitz who held off, expecting a break in prices, in many instances got caught by the advance in operatives' pay, because of this pressure for gay and novel designs. Better grades are rather more in demand. Fleece-lined goods keep up remarkably well.

In underwear, New England jobbers say summer goods start slowly, but this is the least promising section of the country at present. There is a feeling in several of the shrewdest heads that the general tendency in prices is upward.

Knitted Plushes.

An American inventor has brought out an improvement in knitted fabrics in which certain cords or threads, known as "plush-threads," are so knitted into the body of the fabric as to form definite contrasts, figures, or designs, either in color, shape, relief, material, or all four, and allow of be-

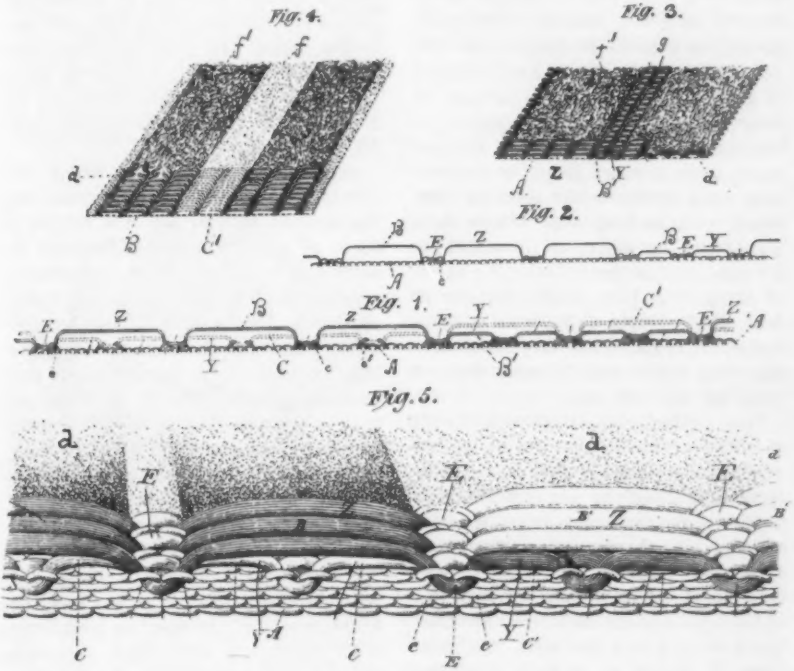
ing suitably napped thereafter, if desired, without injury to the body fabric. The invention is particularly adapted to fabrics knitted on circular-knitting machines.

The objects of the invention are (a) to produce a fabric with intermittent and recurring visible series or groups of pattern-loops, the loops of the same group being of substantially the same height or length and adjacent groups contrasting with each other in length of loops, color, shape, or material, or any one or more of such differentiations; (b) to provide a new method for producing such a fabric.

Some patterns, such as straight and diagonal stripes, can be produced by a slight alteration in the arrangement of parts of the present plush-machines. These objects are obtained in this new device in the manner illustrated in the accompanying drawings.

Figures 1 and 2 are enlarged vertical sectional views showing the construction of the stitches and the relative positions of the threads in detail Figures 3 and 4 are perspective plan views of a fabric showing the invention. Fig. 5 is an enlarged perspective view of a portion of the fabric, showing the construction in detail.

The fabric, thus constructed, differs from others of this class, in having a plush-thread surface of alternating groups or series of loops of plush-threads, some of which loops are shorter than the others. Such groups are aranged so as to be intermittently and recurrently visible and invisible, the relation of such groups to each other and the number of loops in each group being varied at pleasure, whereby various patterns or designs may be formed upon the surface, as desired. This new method of making such a fabric consists in interlacing plush-threads through loops of the binding-threads of the fabric and in so arranging the plush-threads that they will appear above the surface of the fabric in groups or series of loops, each group alternating with another group of a different height or length—for instance, one group "Z" composed of long high loops and a neighboring



group "Y" composed of short low loops —and the groups being separated from each other by short loops of plush-threads tightly interlaced with the body fabric.

Referring to Fig. 1, "A" represents the binding thread composing the foundation texture or body of the fabric—such as knit shirting or hosiery, for example—and which may be of any suitable material. Into this the plush-thread "B" is interlaced or knit, as at "E," in such a manner as to form a long loop raised considerably above the general surface of the fabric. These loops may be knit in series of groups of two or more, as may be desired. At "E" this plush-thread is interlaced, or knit, in such a manner as to form a short loop, "B," raised only slightly above the body as compared with the long loop. These short loops may be also knit in series or groups. In this figure there is a group of three long high loops and one of four short loops of medium height, and short loops tightly interlaced with the body fabric and between each of the long or short loops.

This method of knitting will permit of infinite varieties of design as regards the outline of the figure, thus formed in relief by the difference in height of the respective loops or series of loops. At the same time, if desired a second plush-thread, "C," which may be of different color or material or both, may in the same way be interlaced or knit into the body, "A," and loops "B B'" so as to form a similar series or group of short loops "C" under the long loops formed by plush-thread "B" and in a similar manner several such threads may be knit so as to produce several series or groups of different colors and materials.

At "E" the plush-thread "C" is knit so as to, in its turn, come to the surface and form a long loop or series or group of loops, "C" 'over the short loop "B'" of the first plush-thread. In this case there will be no variety or relief, but a contrast of color or material will be attained, and the design resulting will depend upon the arrangement and dimensions of the respective group of loops. The longs loops, "B" and "C'" may, if desired, now be napped, as shown at "d" Figs. 3, 4, and 5 when the contrast of the respective plush-threads "B" and "C'" will appear in the napped surface both in color, material, and design, as shown at "f f' ", Fig. 4.

Referring to Fig 2, here but one plush-thread is shown, the contrast on the surface showing in the relief attained in the knitting of groups of long and high and short and medium height loops. In this case the long loops may be napped, if desired, leaving the short loops unnapped, as in Fig. 3 at "f' g," thus forming a contrast in relief.

Referring to the machine which the inventor prefers to use in carrying out the method of knitting this fabric, a form of circular-knitting machine is employed with which the plush-bur is used, and first introduce the body-yarn into the needles in the regular way, and then (having adjusted the cam or cams on the pattern-wheel and knitting-cylinder of the machine so that a design consisting of plush-thread loops corresponding to that arrangement of cams is to be woven unto the body), the plush thread or threads are placed into the segmental plush-bur, and the machine started.

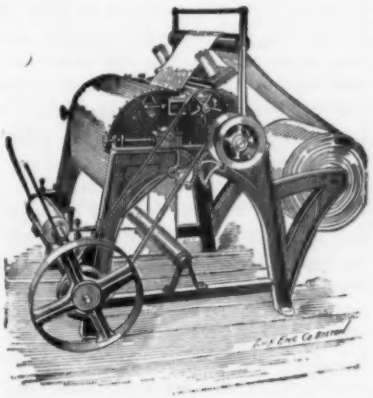
Whenever it is desired to change the position of the groups of loops or the arrangement of the short or long loops with relation to each other, the position of the cams upon the pattern-wheel and upon the knitting-cylinder are correspondingly changed.

The Little Hustler Fleecing Machine.

Fleeced goods have been, and still continue to be, very popular. Some objection has been made to fleeced goods, on the ground that the fleecing or napping tenders the goods. This is a serious fault and one that is likely to occur unless the fleecing is properly done. It was to meet the demand for a machine which would accomplish this work in a satisfactory manner, that John McGinnis, who was at that

time superintendent of the Harder Knitting Co., and is now superintendent of the new mill of the Athens Knitting Co., designed the "Little Hustler Fleecing Machine." He knew the results that he wanted to obtain, and he was successful in making a machine which would accomplish these results.

This machine makes an even fleece on both sides of the fabric, at the same operation. It removes all foreign matter, such as burrs, seeds and shives that would irritate the skin. It is claimed that it does not injure the cloth in the slightest degree, and is so constructed that it is impossible to make streaks or bare spots, or to fleece



one side of the goods more than the other. It requires no attendance from a skilled machinist. One man can attend three machines, and no time or stock is lost by the sewing of ends together, as each piece is handled independently. There is a pneumatic attachment (which is practically noiseless) to remove the lint and dust from the cloth, and prevent it from getting out into the room. The adjustments are simple and can be made while the machine is in operation. The illustration shows how compact and simple it is, and an inspection of the machine in operation certainly demonstrates how well it does its work.

The question of price, which to many manufacturers is the most important, has been placed at a figure which should be within the reach of all. Sufficient time has now elapsed to give ample opportunity of testing the merits of this device, and reference is made to a number of manufacturers who are using the machine, among whom may be mentioned William Harder, Jr., President of the Harder Knitting Co.; Edwin Groat & Son, Hudson River Knitting Mill; A. P. Pitcher, Mellenville Knitting Co.; George H. Lape, Hudson, N. Y.; Henry Hudson, Hudson, N. Y.; Powhatan Manufacturing Co., Norfolk, Va. It can be obtained of The Little Hustler Napper Co., Hudson, N. Y.

Necessity for a Change.

This year began auspiciously for our knit goods industries, and gave promise of the most satisfactory trade conditions. The spring of 1897, owing to the depression prevailing, was by no means bright for our domestic manufacturers, but after midsummer had been reached the mist rolled away, business began to improve, and continued until the close of the season. Now comes the necessity for a change.

The undoubted tendency is towards ladies' fancy vests, instead to those of plain and solid colors. Many of the later novelties in figures and shades which I have seen of late, are of exquisite beauty, and the range in this department of industry is enlarging day by day. Still with the wearer of refined taste, it must not be too gaudy, but of delicate shades. The variety in ladies' vests was never so great as now. For men's wear silk, part silk, camel's hair, lisle thread, cotton mixtures, etc., in delicate colors, are the coming undershirt for midsummer. For the aproaching summer and fall months, some manufacturers are making extra preparations for placing upon the market goods that will excel in quality, color, and finish anything that has previously been introduced.

The knitting mills are experiencing a wonderful period of progress, with the production enormous, out-stripping all previous seasons. Manufacturers in some sections are imbued with a

commendable spirit of enterprise; new works are being erected, extensive additions are being made; modern machinery is being purchased and introduced, that must accrue to the benefit and profit of the large and important interests involved. Some manufacturers have reached a point of great excellence in the manufacture of the finer and more costly make of knit underwear, such as silk, worsted and merino fabrics.

The introduction of these inimitable gems of the designer's and knitter's art, is destined to cause a widespread and deserved admiration of the perfection that has been reached by some of our American Manufacturers. It must be obvious to many of the old line manufacturers, the necessity for a change of some kind. For financial resources, fine and substantial material, and inventive genius, all contribute to the manufacture of knit fabrics that the manufacturer can point to with unpardonable pride, and say: "Don't they beat the foreign made goods!" The machinist's aim is to produce good, simple and efficient machinery, to ease the work of the knitter, by simplifying the various processes so as to produce the best shaped, most substantial, and the most attractive article for the trade, with a due regard to the economy of operation, also to meet home and foreign competition.

Another article of ladies' wearing apparel, which is growing in favor rapidly, is the knit underskirt and bodice combined. There is no more comfortable garment worn. The knitted corset cover is also meeting with good success. This comparatively recent innovation is the best fitting garment imaginable, and is somewhat after the pattern of the knitted jersey. It is made in two shades, and I would say it is the coming corset cover, for while it is tight fitting, there is no other style of goods made that will stretch and give with the body.

The last, but not least, is infants' underwear. The new born babe, since the world began, for aught we know, or have any knowledge of, has been wrapped in swaddling clothes by the kind and solicitous hands of loving admirers, until lately, when the power knitting machine has been brought into play and every detail of it is receiving the greatest attention. Manufacturers are now looking around for special machinery for making full fashioned goods for the little creatures of humanity.

Of late, I have been called to a number of mills, to give instructions how to wash these little garments, which are of exquisite beauty and design when finished. Some are made of the very finest of wool, also of silk, silk mix, silk and worsted, and cotton and wool. The yarn is soft spun, and the cloth is napped gently; so when finished, they are soft and as nice as a downy pillow. Swaddling bands and sleeves to match the garments are also made. So that the new born babe of today is as well provided for as the new woman of today, about whom we hear so much.

These tiny garments are made in six sizes, small enough for the smallest, and large enough for the largest, and as near full fashioned as can be had from a circular machine. These garments bring good profitable prices, with a rise of fifty cents on each number, from size No. 2 upwards. Our American manufacturers can now boast of having knit underwear made on American made machinery, for all classes, young and old, rich and poor, black and white, or any other animal that comes along; even to the new woman of today.

Old Superintendent.

Duties on Hosiery.

The current controversy between customs officers and importers of hosiery and knit goods has attracted much interest among domestic manufacturers of these articles. The importers, it will be recalled, have asked that invoices of misses low priced hosiery be entered at a uniform value for all sizes, instead of at a different value for every size. A delegation of importers visited Washington recently

to urge their case. The home manufacturers decided to oppose these demands, and the secretary of the National Association of Knit Goods Manufacturers went to Washington and submitted the following argument to the Secretary of the Treasury in behalf of the association:

"The question at issue is whether misses cotton hosiery of different sizes is of different values,' as contemplated by the following sections of the Revised Statutes of the United States:

" 'Sec. 2910. When merchandise of the same material or description, but of different values, is invoiced at an average price, and not otherwise provided for, the duty shall be assessed upon the whole invoice at the rate to which the highest valued goods in such invoice are subject.

" 'Sec. 2911. Whenever articles composed wholly, or in part, of wool or cotton, of similar kind, but different quality, are found in the same package, charged at an average price, it shall be the duty of the appraisers to adopt the value of the best articles contained in such package, and so charged as the average value of the whole.

"In accordance with these sections we contend that misses' cotton hosiery is not dutiable at a uniform or average price. This we believe to be the correct interpretation of the law, and no authority other than Congress has legal right to modify by interpretation the language of a law of which the meaning is 'plain and obvious.'

"The Board of General Appraisers said in G. A., 280: 'Our duty is to interpret this law as it stands. If the language plainly admits of but one meaning, we have no right to adopt any other on the ground that it works a hardship upon importers or manufacturers or is otherwise prejudicial to the public good. Congress must be presumed to intend what the language of the law imports, and if the meaning of that language is plain and obvious, then there is no room for construction.'

"Attention is further invited to the decision of the Supreme Court in Binns against Lawrence (12 Howard, 917):

" 'In the construction of the Act of Congress of July 30, 1846, as in that of every other statute, one cardinal rule must govern, and it is this: That wherever the will or intention of the law-making power is declared in plain and unequivocal terms, that will or intention must be followed—absolutely followed. It would not be admissible under such circumstances to attempt a control or modification of that will by speculations of policy or by facts or opinions derived aliunde, as such a proceeding would, in effect, operate a repeal of the positive law, or the abrogation of a superior power by what were the just and regular subjects of its operation.' (Tichenor, G. A., 4047).

"The practice which has led to the contention now upon us is that of invoicing misses' low-priced German hosiery of different sizes at round or assortment prices, quite evidently for the purpose of paying a less rate of duty upon the large sizes than would be due upon them if invoiced separately and at their actual value. It is claimed by the importers in this contention that the commercial practice of invoicing these goods at round prices is conclusive upon the action of the appraising officers.

"We claim in opposition to this view that no commercial practice can change or modify a statute law of the United States. We further claim that there is no uniform practice of buying and selling hosiery of different sizes at a uniform price; the value of these goods is always based upon the size, and this is proven by the fact that different assortments of the goods having different sizes, where the average size is greater, are always invoiced at a higher price than where the average size is less. We claim this as absolute proof that the value of the goods is based upon the size.

"While we could prove conclusively that the goods in open market, both here and in Europe, have a definite value based upon size, our object in submitting this brief is to give the legal status of the case. The pursuance of the policy proposed by importers would result in serious loss to the Government, as well as great damage to American industries and commerce; and we therefore ask that the ruling made by Acting Secretary Spaulding, S. S. 12289, January 20, 1892, shall be reaffirmed as the most equitable and sound legal settlement of the question at issue.

"The appraiser at the port of New York has intelligently presented views similar to our own, which we strongly indorse. Our individual interests in the question involved are large and important, well worthy of the consideration of the executive officers of the Government; but the interests of the Government, committed to your care, are much greater and demand a zealous and impartial administration of the laws for the collection of revenue."

POWER DEPARTMENT

O. R. YOUNG, M. E., Editor.

Mechanical Draft.

In our March issue we published in the Power Department an interesting description of an installation in the mill of Cheney Bros., South Manchester, Conn. We neglected to say, however that the installation was by the B. F. Sturtevant Co., although their name was mentioned in connection with the exhaustion. There can hardly have been any doubt as to this point, for the name of Sturtevant is so thoroughly identified with mechanical draft and blowers that one suggests the other. We are told of a letter containing as its address only the picture of a well-known shoe manufacturer, which, when mailed in Europe, was promptly and safely forwarded to its proper destination. We think the same idea holds good in the case of the mental connection between mechanical draft and the B. F. Sturtevant Co., but nevertheless, the omission of their name and of credit for many of the facts concerning the installation to their recent valuable publication, "Mechanical Draft," was an oversight.

The Duplex Pump.

W. O. WEBBER.

The simplest definition that can be given for a duplex pump is that it consists of two direct acting steam pumps placed side by side, of equal dimensions, but with the valve motion so designed that the movement of the steam piston of one of these pumps shall have the controlling movement of the slide valve of the other pump, the effect of which is to allow one piston to proceed to the end of the stroke and gradually come to a state of rest.

During the latter part of this piston's motion, the opposite piston then moves forward in its stroke and also comes to a state of rest, but in its movement forward and before reaching the end of its stroke, the slide valve controlling the first piston is reversed, and in consequence the first piston returns to its original position, and near the end of its stroke it reverses the slide valve controlling the second piston, and these motions are continuous so long as steam is supplied to the pistons.

It may perhaps be a common misunderstanding that the two pistons of a duplex pump are always moving in opposite directions to each other. This, however, is not the fact. There is a period in the stroke of each piston when both pistons are traveling in the same direction; then one of the pistons reverses and starts in an opposite direction. The second piston, after completing its motion also reverses and starts moving in the same direction as the first piston before that first piston has reached the end of its stroke. Roughly speaking, one piston is about two-thirds of a stroke behind the other.

The advantage of this is that the flow of water from a duplex pump is practically continuous and under ordinary pressures and conditions such a pump does not need an air chamber upon the delivery side of the water end.

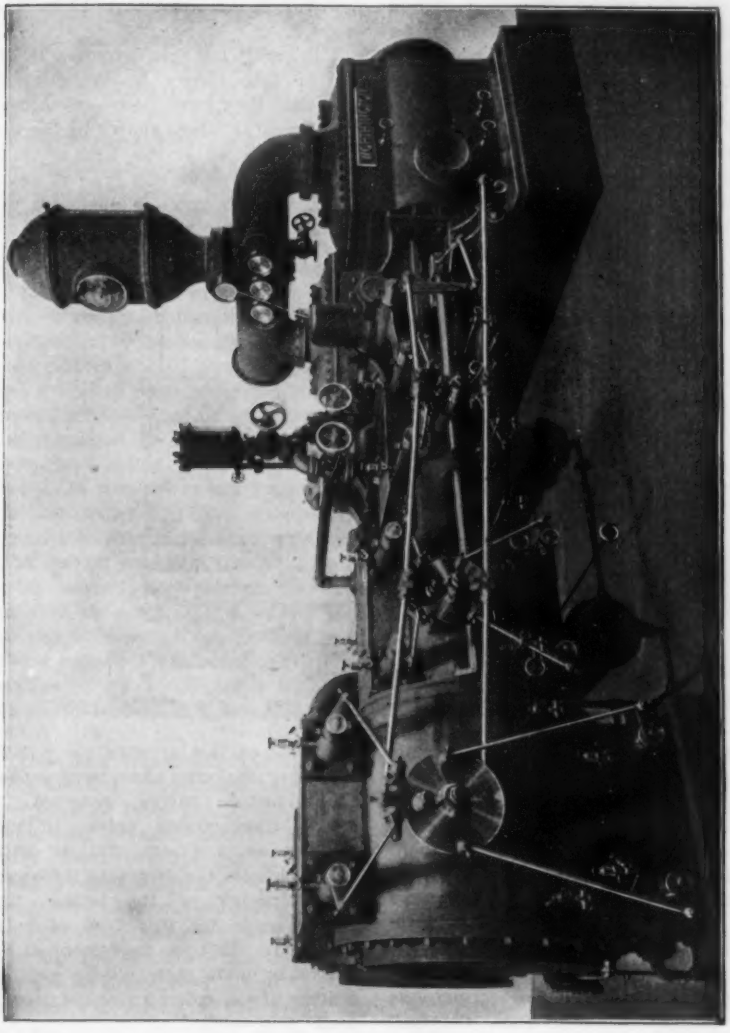
Under high pressures and under the extreme highest suctions it is, however, best to equip even the duplex pumps with an air chamber.

The valve seats of a duplex pump are peculiar, having what appear to be two inlet ports at either end, as well as an exhaust port in the centre. The two end ports, however, are only used for the admission of steam, the two inner ones being for the exhaust.

The slide valves of this type of pump has neither lap nor lead, either inside or outside, and the valve should be so set that when the piston of one

pump is exactly midway of its stroke, the opposite valve just covers the inlet ports on the other cylinder.

In these pumps, there being no mechanism, like a fly wheel or with



THE WORTHINGTON DUPLEX PUMP.

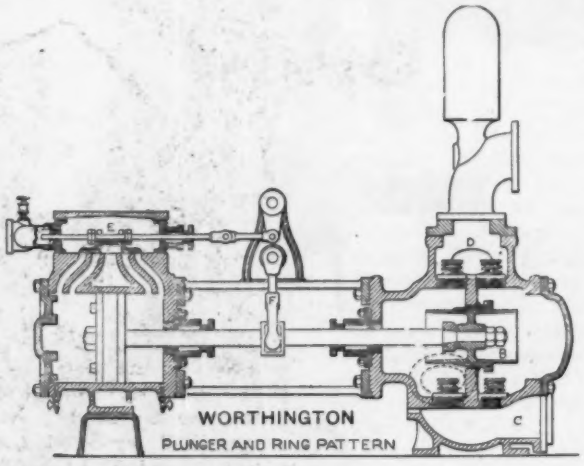
crank and connection rod to prevent the piston from overrunning its stroke, this is accomplished by the piston in traveling to one end of the cylinder running completely over the inner port, thereby shutting off all of the further escapement of the exhaust

steam from that end, and the remaining steam which is thus imprisoned in that end of the cylinder, is compressed between the piston and cylinder head and forms an elastic cushion, which causes the piston slowly and gradually to end its stroke before coming into contact with the cylinder head; also for this same reason there is considerable clearance left in the steam cylinder of a duplex pump, for instance, in the 12" stroke pump this

clearance is about one-half inch (½″).

Another feature peculiar to these pumps is that the slide valve is not rigidly attached to the valve rod, there being a certain amount of lost motion allowed so that the valve stem can travel a slight amount before moving the valve. This lost motion would amount to ⅛″ on small pumps, say on a 10″ stroke; and on a large pump might amount to two or three times this.

When the pistons are in midstroke and their opposite valves are in mid-position so as just to cover the steam inlet ports, this lost motion of the valve must be so adjusted that there



will be an equal amount of lost motion on either side between the projection on the valve and the nut or nuts by which it is to be driven. The use of this lost motion is for the purpose of equalizing the length of stroke of the steam piston on the two sides of the duplex pumps. This amount of lost motion is an absolute amount for each size of pumps, but in manufacturing, it is usual to approximate the amount and then allow the final adjustment to be made on the test block.

The principal reason for allowing this lost motion in the valve is so as to cause a period of rest to occur in each piston, when at the end of each stroke, before it takes up its return motion. This is done to permit the water valves to seat themselves quietly without a sharp shock, and also to allow the incoming supply of water to completely fill the water cylinder. It also has the effect of starting the piston on its return stroke slowly, which has the effect of allowing the inlet valves to also seat themselves quietly.

The credit for this invention is due to the late Henry R. Worthington, and that they have been pre-eminently successful is best shown by the fact that nearly all of the leading pump makers now make this type of pump.

Mr. Worthington's original idea was a pump having plain, flat, D valves. On some of this type of pump built by other makers, have been substituted piston valves actuated by steam, these piston valves in turn moving an auxiliary flat D valve which admits the steam to the steam piston proper of the pump. The claims made for this type of valve motion are, that the movement of the valves is made more elastic and the seating of the water valves is thereby made still easier.

On some of Mr. Worthington's later pumps of large sizes, he has substituted rocking valves for slide valves, and one of his most important improvements on this type of pump was a very ingenious high duty attachment, which consists of two small compensating plungers attached to

the piston rod of each pump. These plungers played back and forth in compensating cylinders which were pivoted about midway of their length in such a manner that as the pistons entered these cylinders, they would stand at an angle of 30° toward the direction from which the main pump piston was approaching. The pistons entering these cylinders, therefore, compressed the air in them until a half stroke of the main piston brought these two cylinders into a perpendicular position at right angles to the main pump piston, when the maximum amount of compression had occurred.

Having then passed the centre, the compressed air in these pistons helped the main piston complete the balance of its stroke by forcing their own pistons out. These air compressing cylinders were connected to an air tank in which the air pressure could be regulated at such a pressure as was best suited to the work being done. It was afterward found better to use water in these compression cylinders, the pipes leading thereto and the air reservoir being also filled with water, but having the compressed air act upon the water. This served to present a liquid packing for these cylinders and also prevent the escape of air by leakage; also kept these pistons thoroughly well lubricated.

This idea was really the invention of a Mr. J. D. Davies and he probably got his idea from Mr. A. S. Cameron, who used a device differing considerably from that suggested by Mr. Davies and afterward perfected by Mr. Worthington, but which had somewhat of the same idea in it, that of storing up some of the energy by means of compressed air at the first part of the stroke of the pump and giving it out to the piston again at the latter part of the stroke so as to equalize the forces acting on the same piston of such a pump.

The great advantage this has over a fly wheel or any other arrangement by which the momentum of moving masses is employed, is that it is elastic and variable and allows of a differentiated degree of movement of the pistons, whereas a fly wheel or any other such device must necessarily maintain a uniform degree of movement and in a movement of this kind the pause at the end of a stroke is only a determinated amount and practically only occupies an instant of time.

Some years ago it was only believed possible to obtain duties approaching 100,000,000 foot lbs. of work done per 100 lbs. of coal on engines of the largest sizes, but by the introduction of the duplex pump and compensating devices of this kind, duties as high as this have been obtained on compound pumping engines as small as an 18 and 36x14x18, and on triple expansion engines as small as 12, 18 and 29x13½x18.

Electricity.

SWITCHBOARDS.

ERNEST W. DAY.

Among the many pieces of apparatus common to an electric lighting plant, not the least in importance is "the switchboard." This, to the uninitiated, is often a peculiar and mysterious combination of objects, simple in themselves, but when arranged or grouped together in a small space for convenience in accomplishing certain specified results, often makes an extremely intricate and complicated affair.

It will be the purpose of this article to make clear to readers as far as possible, the more common methods and the apparatus by which "the juice" is controlled from one point, and made to conform to the desires of the operator according to its own natural laws.

In order to pass inspection by the Fire Underwriters, switchboards must either be constructed of fire proof material or built of hard wood in skeleton form and thoroughly filled to prevent absorption of moisture.

The material most commonly used is marble and slate, popular custom

giving preference to the latter. The surface is made uniformly smooth and usually flowed with black enamel, which gives an appearance similar to polished hard rubber.

The location of the switchboard should be selected so that the danger of fire being communicated to adjacent combustible material is as far as possible entirely removed.

It should be accessible from all sides when the connections are on the back, room enough being left behind to work comfortably.

It may be placed against a brick or stone wall only when all wiring and connections are on the face.

Special attention is called to the fact that the body of the switchboard should not be built down to the floor, a space of ten or twelve inches being left between bottom of the board and the floor, and from eighteen to twenty-four inches between the top of the board and the ceiling, in order to prevent fire from communicating from the switchboard to the floor or ceiling, also to prevent the forming of a partially concealed space liable to be used for storage of waste, brooms, mops and general catch-all for rubbish of all kinds.

It is hardly necessary to state that water, steam pipes, and all moisture of whatever nature should be kept away from electrical apparatus of all kinds.

The usual method of supporting the slabs of slate in an upright position is to bolt flush to their edges full length angle irons, which in turn are bolted together as the slabs are placed edge to edge.

Iron rods or braces from the wall to the angle irons form a substantial means of holding slates ridged and firm; adjustment of length of these rods should be provided for by means of a long nut, with a right and left hand thread tapped in each end, respectively, giving a range of adjustment of one inch either way, thus the face of the board may be brought in line without trouble.

The customary practice in switchboard construction at the present time is to place all switches, amperemeters, volt-meters, watt-meters, circuit breaking devices, etc., on the front of the board, having all connections at the back. Standard apparatus being built with this point in view.

In large plants the generator switches and controlling instruments are separate from the feeders, in many cases a separate switchboard being provided for the feeders, the object being simplicity and ease of manipulation.

The instruments are usually placed on the board in panel sets and the slabs are so designed as to be of sufficient width only, to accommodate its own set of instruments, thus making it possible to extend the board by the addition of one or more panels at any time without interruption to the service or disturbance to the connections.

Bus bars are made of flat copper, to afford large radiating surfaces, supported by stands secured to the back of the slate, the stands being of sufficient length to hold bars ridged and firm about six inches from the back of the switchboard.

Switches are usually so constructed that connections lead back through the board passing through a copper strip, which is held in place and contact by a nut on each side; by this means connections are made from the switch terminals to the bus bars or other instruments.

Knife switches must be so placed that gravity will tend to open rather than close the switch.

Switches, cut-outs, etc., must be so arranged that the opening of the switch or cut-out will disconnect all wires; that is, in a two-wire system the two wires, and in a three-wire system the three wires, must be protected by the cut-out and disconnected by the operation of the switch.

(To be continued.)

—In practice it is found that some yarns scour much easier than others, owing to the nature and quantity of the oil used in their spinning.

DYEING DEPARTMENT.

Dye Recipes for April.

The following recipes appear in the Dyers' Supplement, which is issued each month by the TEXTILE WORLD. The Supplement contains the colored samples, dyed according to recipes given. The selection of samples is carefully made, and it is the aim to show shades which are of especial interest to the dyer, and which the requirements of the market demand. The Dyers' Supplement is a 16 page pamphlet, in convenient form for preservation. Subscription price for the TEXTILE WORLD with the Dyers' Supplement is $3.

RECIPE NO. 49.

Light Drab on Worsted Yarn.

Gray N on 100 lbs. worsted yarn.

Prepare dyebath with

4 oz. Gray N.
(Anchor Color Mfg. Co., 462 Cherry St., New York.)

Enter in yarn at 120° F. Bring to boil while turning, and turn 10 to 15 minutes at that heat. Lift out and wash.

Gray N is a new color, and will also dye on cotton. The color works very evenly. It requires no mordanting, and a number of shades from a light gray to a full, deep blue or black can be dyed from it by varying the amount of dyestuff.

RECIPE NO. 50.

Seal Brown on Cotton Yarn.

Direct Brown M on 100 pounds cotton yarn.

Prepare dyebath with

3 lbs. Direct Brown M.
(Sykes & Street, 85 Water St., New York.)
20 lbs. Common Salt.

Enter in yarn at boil and turn one hour at that heat.

Direct Brown M produces a full, dark shade of brown, in one dip, and like Direct Brown R and J (shown in recipes 34 and 37, respectively), it will combine with other direct salt dyes. These three dyes will enable the dyer to produce any required shade of brown needed, either by combining them or using them separately.

RECIPE NO. 51.

Medium Blue on Worsted Yarn.

Alizarine Lanacyl Blue 3 B on 100 lbs. worsted yarn.

Prepare dyebath with

3 lbs. Alizarine Lanacyl Blue 3 B.
(Wm. J. Matheson & Co., 78 Front St., New York.)
10 lbs. Glauber's Salt.
5 lbs. Acetic Acid.

Enter yarn in a bath at 80 deg. F.; give two turns; bring temperature slowly up to a boil, and turn to shade at that heat.

Alizarine Lanacyl Blue 3 B is a new color, and will produce different shades of blue, which will be of great benefit to dyers, as it is fast, does not rub off, stands light, and is dyed in one dip. This blue will do all that is represented of it, and is well adapted to worsted and woolen piece-goods, on account of its penetration and level dyeing.

RECIPE NO. 52.

Black on Wool Hat Felt.

Logwood and Fustic on 30 doz. wool hats, weighing 110 lbs.

Mordant for 2½ hours at boil with

3 lbs. Bichromate of Potash.
2 lbs. Blue Vitriol.
½ lb. Sulphuric Acid.

Wash off and dye in a separate bath with

15 lbs. Solid Logwood Extract N.
2 lbs. Fustic Liquor L.
(Stamford Mfg. Co., 133 Front St., New York.)

Enter in hats at boil, and pole 2 1-2 hours at that heat, and add

2 lbs. Copperas.
1 lb. Blue Vitriol.

Pole 1-2 hour longer; lift out, and let air or cool down before washing.

In dyeing hats, either wool or fur, with Logwood Extract N., the dyer will find it an excellent extract, on account of its penetrating the felt quickly and producing an evenly dyed color through the felt. (See this combination on other wool materials in 1897 re-

cipes 71, 72, 124 and 134; and 1898 recipe 36.)

RECIPE No. 53.

Red on Worsted Yarn.

Titan Red on 100 lbs. worsted yarn.

Prepare dyebath with

2½ lbs. Titan Red.
(Read, Holliday & Co., 100 William St., New York.)

3 lbs. Acetic Acid.

Enter in yarn at boil, and turn one hour at that heat.

Titan Red produces a full, mellow and rich shade of fast red, as here shown. It works slowly and level on the yarn. It does not bleed or rub off when in contact with other colors, while washing. (See recipe 42 in our March number.)

RECIPE No. 54.

Light Green on Worsted Yarn.

Wool Green S S on 100 lbs. worsted yarn.

Prepare dye bath with

1 lb. Wool Green S S.
(John J. Keller & Co., 104 Murray St., New York.)

3 lbs. Sulphuric Acid.

10 lbs. Glauber's Salt.

Enter in yarn at 120° F., bring to boil while turning, and turn to shade at that heat.

Wool Green S S is a very soluble dye, colors perfectly level on the fibre, producing fast shades, and will be of great value in combinations, on account of its fastness and strength. It dyes a clean shade which does not rub off.

RECIPE No. 55.

Red on Cotton Yarn.

Brilliant Red D on 100 lbs. cotton yarn.

Prepare dye bath with

2½ lbs. Brilliant Red D.
(A. Klipstein & Co., 122 Pearl St., New York.)

10 lbs. Glauber's Salt.

Enter in yarn at boil; turn one hour at that heat, and allow bath to cool down one-half hour while turning, slowly.

The shade here displayed is largely sought after by dyers; the dye itself being a straight one, is very soluble, and will color, with small amounts, very fine shades of fast pinks (see recipe 45.)

RECIPE No. 56.

Dark Violet on Worsted Yarn.

Alizarine Lanacyl Violet B. on 100 lbs. worsted yarn.

Prepare dyebath with

3 lbs. Alizarine Lanacyl Violet B.
(Wm. J. Matheson & Co., 178 Front St., New York.)

10 lbs. Glauber's Salt.

5 lbs. Acetic Acid.

Enter in yarn at 80° F.; give two turns, then bring slowly to boil, while turning, and turn to shade at that heat.

Alizarine Lanacyl Violet, like Alizarine Lanacyl Blue (see recipe 51 this month), produces fast shades of violet, and as both colors will work together in combination, fine dark and rich shades of blues can be dyed at a low cost. The shades are fast to light and soap, and are well adapted to dyeing woolen and worsted piece-goods.

RECIPE No. 57.

Blue on Cotton Flannel.

Blue D B on 100 lbs. cotton flannel.

Prepare dyebath with

2 lbs. Alizarine Blue D B.
(Victor Koechl & Co., 79 Murray St., New York.)

50 lbs. Common Salt.

2 lbs. Sal Ammoniac.

Enter in cloth at 110° F., bring to boil while turning, and turn 45 minutes at that heat. Rinse off and turn for 20 to 30 minutes at 150° F. in a bath of

3 lbs. Blue Vitriol

Rinse.

Alizarine Blue D B, like the D G brand (see recipe 179 December number), becomes slightly changed by an after treatment with blue vitriol, but the color is very fast and the shades show a very fine brown.

RECIPE No. 58.

Brown on Worsted Yarn.

Fast Brown 25 on 100 lbs. worsted yarn.

Prepare dye bath with

3 lbs. Fast Brown 25.
(Anchor Color Mfg. Co., 462 Cherry St., New York.)
4 lbs. Sulphuric Acid.
10 lbs. Glauber's Salt.

Enter in yarn at 120° F.; bring to boil while turning, and turn to shade at that heat.

Fast Brown 25 is used with acid and readily combines with similar dyes, producing a full and bloomy shade of brown. The color works slowly and evenly on the fibre, resulting in level shades.

RECIPE NO. 59.

Orange on Cotton Yarn.

Dingley Yellow 17 on 100 lbs. cotton yarn.

Prepare dye bath with

2 lbs. Dingley Yellow 17.
(Hanna Schoellkopf & Co., 135 No. Water St., Philadelphia.)
20 lbs. Glauber's Salt.
3 lbs. Alum.

Enter in yarn at 140° F., bring to boil while turning, and turn to shade at that heat.

Dingley Yellow 17 will be found to be an elegant color. It works on cotton in a direct dyeing bath. The color is fast, and dyes a level shade. It produces a fine, full shade of yellow.

RECIPE NO. 60.

Blue on Worsted Yarn.

Acid Blue A A on 100 lbs. worsted yarn.

Prepare dye bath with

3 lbs. Acid Blue A A.
(John J. Keller & Co., 104 Murray St., New York.)
4 lbs. Sulphuric Acid.
10 lbs. Glauber's Salt.

Enter in yarn at 120° F.; bring to a boil while turning, and turn to shade at that heat.

We show here a full shade of blue, dyed with three per cent. color. The color being of a reddish hue, makes it appear as a fine and bloomy shade. Acid Blue A A produces both light and dark level shades. (See recipes 22 and 38.)

RECIPE NO. 61.

Seal Brown on Cotton Yarn.

Direct Brown 5095 on 100 lbs. cotton yarn.

Prepare dyebath with

2 lbs. Direct Brown 5095.
½ lb. Direct Navy Blue 5096.
(The Stone & Ware Co., 157 Maiden Land, New York).
15 lbs. Common Salt.

Enter in yarn at boil, and turn one hour at that heat.

Direct Brown and Navy Blue work well together for producing different shades of brown. A variety of shades can be dyed from these two dyes, by varying their proportions. (See recipes 39 and 40, in our March number, for these dyes used separately for a dark blue and brown, respectively, on cotton knit goods.)

RECIPE NO. 62.

Red on Worsted Yarn.

Brilliant Bordeaux S on 100 pounds worsted yarn.

Prepare dyebath with

2¼ lbs. Brilliant Bordeaux S.
(New York & Boston Dyewood Co., 55 Beekman St., New York.)
4 lbs. Sulphuric Acid.
10 lbs. Glauber's Salt.

Enter in yarn at 120° F., bring to boil while turning, and turn to shade at that heat.

A beautiful shade of red is shown here. The shade produced is very rich, and has a fine bloom. The dye is strong and fast. It is of great value to dyers for combining with other dyes, on account of its working slowly on the fibre. (See recipe 47.)

RECIPE NO. 63.

Light Blue on Worsted Yarn.

Sulphon Acid Blue B on 100 lbs. worsted yarn.

Prepare dyebath with

8 oz. Sulphon Acid Blue B.
(Farbenfabriken of Elberfeld Co., 77 William St., New York.)
1 lb. Acetic Acid.
10 lbs. Glauber's Salt.

Enter in yarn at 110° F., bring to boil

while turning, and turn 15 minutes; then add

1½ lbs. Acetic Acid

and turn 3-4 hour longer. Rinse.

This house offers two brands of Sulphon Acid Blue, R and B. The shades produced by dyeing with these dyes are extremely fast to light, and are fairly fast to steaming. By an after-treatment with bichromate of potash, the fastness to steaming is increased.

RECIPE NO. 64.

Red on Cotton Flannel.

Acridine Orange G and Rhodamine 3 G on 100 lbs. cotton flannel.

Mordant in the usual way with Tannic Acid and Tartar Emetic, and dye in a bath with

1½ oz. New Acridine Orange G.
4½ oz. Rhodamine 3G.
(C. Bischoff & Co., 87 Park Place, New York.)

Enter in cloth at 90° F. Bring temperature up to 120°, and turn to shade at that heat.

The above two colors combine well together, and by varying the proportions, some very fine shades can be produced. (See recipes in 1897, Nos. 165 and 177, in which Acridine Orange G is used alone; and 1897 recipes Nos. 73, 82, 122, and 1898 recipes Nos. 14 and 25, in which Rhodamine 3 G alone is used.)

New Dyes.

We present in this month's Dyers' Supplement some new dyes that have not before appeared in our recipes.

In recipe 49 appears a popular dye, procured from the Anchor Color Mfg. Co., New York., known as Gray N, which is used by us for producing a light drab on worsted yarn. This is a dye that works either on cotton, wool, or mixed goods, and gives shades from a gray to a blue black, or to a pure black, the latter being obtained by the use of five per cent. of the dye. This quantity gives a full black shade on either cotton, wool or mixed goods.

Wm. J. Matheson & Co., New York. have their Alizarine Lanacyl Blue 3 B, shown upon worsted yarn, for the production of a medium blue, in recipe 51. There are four brands of Alizarine Lanacyl dyes, which were brought out by this house, because of an expressed desire of dyers for dyestuffs, which when simply dyed in an acid bath, will yield dark blue shades, fast to light, and that will not rub off. The principal value of these dyes is their usefulness for dyeing piece goods, and for this industry they promise to become of the same importance for producing blue shades as the naphtol blacks and alizarine blacks that are sold by this house for dyeing blacks. They are also excellent for yarn dyeing, for which our present recipe is applicable. These remarks will apply to Alizarine Lanacyl Violet B shown in recipe 56, for the production of a dark violet on worsted yarn.

In recipe 63, is shown the effect of Sulphon Acid Blue B, furnished by the Farbenfabriken of Elberfeld Co., New York, for the production of a light blue on worsted yarn. We call particular attention to our dyer's comments concerning this dye.

A New Chrome Mordant on Animal Fibre.

O. P. AMEND.

[There has been much interest manifested among dyers and chemists concerning the new Amend "cold process," so called, of chrome mordanting animal fibre. Its introduction to the trade has been attended, so far as we can learn, with much sucess. A recent lecture of Mr. Amend presents an interesting description of the mordanting process under the old as well as his new method, and explains, at length, the new process and the advantages which are claimed for it. The Amend Process Co., of 205 Third Ave., New York, control this process, and are now in a position to make arrangements with the manufacturers for its use. Mr. Amend's description follows herewith.—Ed.]

By mordants we mean chemicals that will form combinations with the fibre and these combinations of the

fibre and chemical will again combine with, or form a lake with, the dyestuff or colors in the subsequent dye bath. The colors so produced are as a rule very fast to light and washing and do not crock. The salts of aluminium, chromium, copper, cobalt, iron, nickel, manganese and other chemicals have been employed for this purpose, but the most important by far is chromium. It is usually employed in shape of a chromic salt such as bichromate of potash or soda. Acetate and fluoride of chromium, have been suggested and are used to some extent. The above mentioned bichromates however still seem to be in general use. Along with the bichromates an acid salt or free acid is used The object of this addition is to produce a reduction and decomposition of the bichromate employed, in order that the so reduced bichromate may be deposited on and combined with the fibre. Various compouds have been employed for this purpose. Bitartrate of potash or argols and oxalic acid are preferred in alizarine dyeing; sulphuric acid, lactic acid and the lactates are preferred in case of logwood dyeing. A new method has been suggested in Germany, by which the bichromates are first decomposed by means of sulphuric acid, after which lactic acid or a lactate is added in order to still more reduce the so-decomposed bichromate. It will be seen that the object of all these acid salts and acids is to produce as complete a reduction of the chromium salt on the fibre, as is possible. None, however, obtain this much-sought-for result in a perfectly satisfactory manner. On examining the mordants so produced a yellowish tinge can always be observed, which is due to an incomplete reduction. E. Knecht has proposed to reduce the remaining chromic compounds by means of a warm solution of bisulphite of soda.

The object of the new mordant (Amend process) was to combine chromium with animal fibre in such a way as to leave the fibre in its most natural state, and in order to obtain this result, boiling had to be avoided. It was found that free chromic acid combined with animal fibre at ordinary temperatures. The nature of this chemical combination has not been definitely determined, for the simple reason that the chemical composition of animal fibre is not thoroughly known. But if a classification was to be made, this new compound would be placed under the heading of a chromic salt, the animal fibre taking the place of the base; in fact, it might be compared with some of the more sparingly soluble bichromates.

The similarity of the reactions of this new chomic acid animal fibre compound to the inorganic bichromates, may be illustrated by its action towards the aromatic amines. It is well known that bichromates acting on aniline, or its salts, produce so-called aniline blacks. The same reaction takes place when using this new chrome fibre compound. The aniline black thus produced is formed on the animal fibre, thereby producing a fast black on furs, wool, etc. It has been laid down in all the literature on this subject, that no satisfactory aniline black could be produced on animal fibre, on account of the reducing action of the latter. Nolting & Lehne (page 57, Anilinschwarz und seine Andwendung, etc.), in describing a proposed process for aniline black on wool or silk, say: "Dieses Verfahren ist ebenso unpraktisch wie alle ubrigen bisher zum farben der Wolle vorgeschlagenen."

This reducing action has been explained by various authors in many different ways, but, whatever may be the cause of the same, it is a fact that it has been overcome in the new chromic fibre compound.

As the chromic fibre compound was of such great value in producing a fast aniline black, the next step was to produce a chrome oxide fibre compound, by simply substituting some other reducing agent in place of the aromatic amines. It was found that any of the well known reducing agents could be used, and after a

great number of trials, sulphurous acid, in shape of the commercial solution of bisulphite of soda, proved to be the most practical. The chromic acid animal fibre compound is subjected to a very dilute solution of bisulphite of soda, and thereby reduced to a chrome oxyhydrate animal fibre compound. As this reduction takes place at ordinary temperature and in very dilute aqueous solutions, it is easily seen that the fibre is not acted upon in any injurious way. The bright yellow chromic acid compound is now converted into a bluish green chrome oxyhydrate compound. It had always been the object of the dyer to produce a chromated fibre with as little injurious action in the latter as possible. Although they used the chemicals in very dilute solutions, a temperature of the boiling point of water was necessary during the mordanting operation, which lasted from one to one and one-half hours. This certainly, had an injurious action on the fibre, such as felting, weakening, loss in weight and harsh feeling. The new process overcame these difficulties, as the solutions employed were still more dilute and were applied at ordinary temperatures.

It was shown by actual analytical research that all of the old boiling mordanting methods had injurious effects on the fibres. The boiled fibre was found to have lost from ¾ of 1 per cent. to 2½ per cent. of its actual weight, according to the material employed; consequently the hot mordant rendered a part of the material soluble, thereby changing its chemical composition. The loss expressed in percentage does not seem great, but in converting it to practical figures it shows as follows: In a mill dyeing 10,000 pounds of wool a day and supposing the average loss to be 1 per cent. it would represent a loss of 100 pounds of wool per day, which loss is due to the extracting action of the boiling mordant bath.

Any practical comparative tests between the old boiling and the new mordant will show great physical differences so far as elasticity, feel and appearance of the surface are concerned.

In the new process invented by O. P. Amend, the loss in weight of the wool is scarcely appreciable, and this would prove conclusively that no destructive change has taken place. The second action of the old mordant boiling bath is an oxidizing one, which can easily be demonstrated in an unmistakable way, by applying such mordant to so-called indigo-bottomed material. Although indigotine is quite a stable compound, it is oxidized by this hot mordant to a large extent, and it is therefore self-evident that the much weaker animal fibre must necessarily suffer to a still greater degree. By applying the new Amend mordant to the same indigo-bottomed wool no perceptible change takes place, the indigotine is not oxidized, and therefore it is safe to assume that there is no oxidizing action on the fibre. It is well known in the art of dyeing that the harsh and brittle properties of the fibre are due to oxidation, and that explains the superior qualities as to feel and textile strength of fibre mordanted according to the Amend process, when compared to that mordanted in the boiling bath. The fibre resulting from hot mordant always produces a material of inferior spinning qualities, while that mordanted according to the Amend method shows no perceptible change from the original fibre.

It was found that chromic acid combined very readily with animal fibre in very dilute solutions (the solution containing 1-30 of 1 per cent. of chromic acid) and that almost the theoretical amount (that is to say about 97 per cent. of chromic acid) was taken up by the fibre in presence of a secondary acid (the amount of such acid employed being 1-10 of 1 per cent). This secondary acid also proved to be of value in the reducing step of the process. Knowing that chromic acid combined with animal fibre at ordinary temperature the next question to be considered was: Would this secondary acid, or part of it, also combine with the fibre at ordinary tem-

perature? That acids combine with animal fibre at the boiling point of water is know and is so stated by Hummel and Knecht. It was found, by analysis, that 66 to 70 per cent. of the secondary acid employed combined with the fibre. The next step was to get rid of this acid so as not to interfere in the subsequent dye bath. Could it be removed by simple washing or would it be more practicable to remove it by means of a chemical agent? Both ways proved successful.

After this traetment we have the chrome-oxyhydrate in its pure form on the fibre, free from chromic and all other acids, and we have before us an ideal form of a lake-forming mordant. The application of the alizarine series in ammoniacal solution (this renders them more soluble and thereby admits of a more even and penetrating dyeing) has always been the desire of the dyer, and the new mordant is especialy adapted to this method. A short reflection will show why none of the old chrome mordants will answer as well. It has been admitted by all authorities, that in the old styles of mordanting, the fibre contains chromic acid, or combinations of chrome which are easily acted upon by ammonia or alkali, and therefore the dyeing in such alkaline baths was rather difficult and very uncertain. That the new mordant, after having been washed by an alkali, is free from all the above mentioned objections, is self evident. The conclusive proof of this assertion can easily be shown in an experimental way. It will be seen that any of the old mordants treated with distilled water will color the water a yellowish tinge due to soluble chromic acid compounds, wheeras the new mordant does not give up anything to the distilled water. The same reaction will take place in a more vigorous manner in the hot dyebath, that is to say, the old mordant will give off a part of its chrome in soluble form, which will necessarily produce precipitates or lakes with the dyestuffs in the dyebath, thereby producing a so-called smutting of the material. This involves not only a loss of coloring matter employed, but it also produces colors which will not stand a thorough scouring or stand a severe crocking test.

Now let us look at the product of the new Amend mordant. The first thing one's attention is drawn to, is the condition of the dyebath, and here the most striking illustration is given in case of the logwood dyebath, logwood being the most delicate and difficult dyestuff. In using any of the hot mordants the logwood bath will turn an inky color, which shows conclusively that an oxidation or a formation of a dye-lake has taken place in the bath. It is known to everyone skilled in the art that such a dyebath will not produce a perfectly clean dye.

In the new or cold moruant the bath will show at all times a typical logwood color, absolutely clear and transparent, and not having a changed shade due to any oxidation. This fact explains the superiority of color produced by the Amend mordant.

Moreover, it is easily understood that as there is no loss by precipitation or oxidation, the amount of coloring matter used with the new mordant must be considerably less than with any of the hot mordants. This fact has been ascertained in a long run in many of the dyehouses, the actual saving having been from 15 to 30 per cent. in logwood and logwood extracts. The hot mordant has been shown to produce a loss in coloring matter where the reactions are clearly visible in the result as in the case of logwood. The same thing takes place in case of alizarines and other mordant combining colors, where the reactions cannot be as easily followed by actual observation, but the loss is shown by the saving of the coloring matter in the new Amend mordanting process. Another proof of the superiority of the colors produced by the new Amend mordant, is a comparative exposure to air, light and moisture of samples dyed with equal percentages of dyestuffs by the new and old mordants. One will readily notice the much greater resistance of the colors produced by the Amend mordant, as compared with

those by the old mordants. The different alizarine blues, for instance, show a characteristic bearing towards the action of direct sunlight. It is well known that the alizarine blues fade to a grayish shade, whereas indigo fades simply to a different shade in blue. Alizarine blues dyed by the Amend mordant fade also, but instead of the gray shade produced by the old mordants, they, like indigo, fade to a different shade of blue.

A simple explanation of these reactions can easily be found, when we bear in mind that all of the old mordants contain chromic acid or acid salts of chromium, whereas the Amend mordant is free from these objectionable compounds. We have already demonstrated the destructive action of chromic acid and chromic salts in the dyebath, and in presence of moisture and light they continue their ruinous action on the color as well as on the fibre. The correctess of these assertions is evident, inasmuch as every practical dyer admits that colors produced on heavily mordanted material will not stand the action of light and air, as well as the same color would on a less heavily mordanted fibre; this plainly shows that the more heavily mordanted the material is by the old boiling method, it contains proportionately more chromic acid or its salts, whereas, in the Amend method no matter how heavily mordanted the material might be, there is no possibility of these undersirable compounds being present.

We think, therefore, that:

(1.) The saving of steam,
(2.) The saving in coloring matter,
(3.) The saving in wool weight,
(4.) The improvement of stock,
(5.) The improvement in colors,

as before shown, will appeal favorably to everyone, and will be convincing of the advantages to be obtained by the use of the Amend process.

Corrections.

There appeared in the article on "Silk Gloss on Cotton Yarn," published in our February issue, on page 94, several typographical errors, which should be corrected. In the fourth line from the bottom, right hand column, page 95, "change" should read "charge," and wherever the word "grains" is used, on page 96, it should read "grams." In the third line of the second paragraph, right hand column, page 96, "stretches" should read "stretchers."

Textiles in Persia.

Cotton goods are the most important articles of commerce in Persia. They are imported chiefly from England, but Russia, owing to its vicinity, has succeeded in introducing considerable quantities into Northern Persia. In all financial and commercial operations an intermediary called a "tellal" must be employed; very long credits are always granted, and it is difficult for a European house to transact business in Persia without a representative. The woolen goods used are generally of inferior quality, and come from Austria and Germany; silk comes from France, Germany and Italy. Most of the silk produced in Persia is consumed locally; the rest goes to Russia, and in small quantities to England. There are millions of sheep, and the wool is of good quality. Much of it goes to Russia, some to France, or via Marseilles to the United States; a certain proportion is used locally in the manufacture of carpets, etc. Cotton grows readily, and during the American civil war, when there were no exports from that country, the Persian production reached enormous proportions, but it subsequently fell to its ordinary level. The chief centres for the manufacture of carpets are Suntarrabar, Korassan, Chiraz and Kurdistan. In the first named place, one house alone employs more than 10,000 workmen. In the manufacture of carpets a workman receives a little over 3 cents a day, and a carpet worth $40 is sometimes in the hands of three workmen for some six months. The raw materials cost very little, as cotton and wool can be obtained at a very low price in Persia.

QUESTIONS AND ANSWERS.

Under this head we undertake to answer, free of charge, to the best of our ability, any pertinent inquiry pertaining to textile matters received from any regular subscriber to the TEXTILE WORLD. Questions should be stated as briefly and concisely as possible. Inquiries pertaining to textile processes, machinery, improvements, methods of management, the markets, etc., are especially invited, as well as any legitimate discussion on the views expressed. All inquiries must be accompanied by the name of the person inquiring, not for publication, but as an evidence of good faith.

Designer's Outfit.

Editor Textile World:

Will you be so kind as to let me know as soon as possible the price of a designer's outfit for a beginner, including paper, brass, picker, etc.

Philadelphia. A. S.

We would suggest writing to Queen & Co., Philadelphia, Pa.

Lacings for Underwear.

Editor Textile World:

Can you put us in communication with people who make lacings similar to which we enclose samples. We use a great many of these lacings, and we want to find where we can buy them in skeins, both silk and cotton, in white. We can color them ourselves. We also would like to look into the matter of twisting and tipping machines for putting on the metal tips, with a view possibly to making our own lacings, if we can get the machines to do it.

Sand.

We would refer you to Hepner & Horwitz, 30 Howard St., New York, who are large dealers in lacings for underwear, both tipped and tasseled. It hardly seems to us economical for you to attempt to make for your own use lacings, even if you use a large quantity. We have never heard of any manufacturers of knit goods doing so. The machinery ,especially the tipping machines, is quite expensive, and we do not see how you could make anything by it.

Can Dyers Answer?

Editor Textile World:

Can any of your practical readers give first class formulae for the following: (1) The zinc process discharge. (2.) A fine black with analine oil or salt, one dip. (3.) Aniline indelible ink for linen, in one preparation.

Philadelphia. F. G. B.

Steaming Knitted Fabrics.

Editor Textile World:

Can you inform me if manufacturers of ribbed knit goods, using from No. 9 to No. 11 cotton yarn, generally steam their fabrics before making up?

New York. J. B. B.

The question put by our correspondent is not very explicit. Yarn is often steamed and bleached before being knit, but cotton knit goods are not steamed before being made up, so far as we know. Some manufacturers, a few years ago, steamed their goods after being made up, before washing them, but we think very few, if any, do it at the present time, as it is regarded as lost labor, unless it is for some special purpose. Woolen goods are sometimes steamed for special purposes, to prevent shrinking after being made up. If any of our practical readers have any information to communicate on this point, we should be pleased to receive it.

Books on Cotton Spinning.

Editor Textile World:

I want some textile books on cotton carding and spinning. Have you got them up to date, or do you know where I can get them?

South Carolina. L. A. A.

We would refer our correspondent to the list of textile books found elsewhere in this issue. The work on Cotton Spinning, by W. Scott Taggart, price $1.75 per volume, is a most excellent one on this subject. The work by Joseph Nasmith, entitled Students' Cotton Spinning, takes up all of the operations from mixing to the yarn, and is regarded as a standard work on this subject. Price $2.50.

Wool Printing.

Editor Textile World:

In my position, as colorist, I have become interested in the printing of wool. Can you give me directions where I can obtain information about wool printing, discharging of wool printings and resisting of colors, to be dyed on wool. I also would like information concerning water proofing of woolen cloth and unions.

Massachusetts. N. W. C.

We would suggest that our correspondent obtain the very recent work on "The Printing of Textile Fabrics," by C. F. Seymour Rothwell. Price $6.50. This is a practical manual on the printing of cotton, wool and silk, and half-silk fabrics, by one who is thoroughly familiar with

the subject treated in the work. The book takes up such subjects as the machinery used in printing, thickeners and mordants; colors produced directly on the fibre; padding style; resist and discharge styles; the printing of compound colorings; the printing of woolen goods, including discharges on wool, etc. The book has a number of plates illustrating the text, and specimens of printed fabrics. If desired we will furnish the work at the price quoted. See March Textile World, page 97, for an answer on water proofing.

Yarn Printing Machine.

Editor Textile World:

Referring to the article on page 98 of your March issue, I enclose herewith circulars of yarn printing machines for hanks, which I think will satisfy the inquiry of your correspondent "Elastic."

Evan A. Leigh.

Boston, Mass., Mason Building.

We have sent the information to our correspondent. Circulars, which Mr. Leigh sent us, show machines for one, two and three color hank printing.

Four Yard Tapes.

Editor Textile World:

Do you know of any manufacturers of four yard tapes put up in boxes. We would like to connect with the right party. Also right parties who make silk bindings, as per sample enclosed. I have communicated with tape manufacturers advertised in the Textile World, but find this does not come exactly in their line.

Colum.

Will some one furnish the information?

Lantern Slides For Textile Exhibits.

Editor Textile World:

I desire to secure information concerning the photographing of cloth, and have been referred to you. I have been making transparency plates for lantern projections, from my own negatives, with very poor results. I have a special long bellows camera, and for interior exposures require 60 seconds, and for outside, five seconds; but these exposures do not give satisfactory negatives, and whether it is my lenses or not, I am unable to say. I can, however, produce from negatives of other regular camera exposures the best of lantern slide work. For instance, my kodak negatives of outside objects produce first class slides. I want these to use in connection with a stereopticon, for describing the construction of cloth, parts of mill machinery, plans, etc.

South. N. C. M.

We should advise our correspondent to consult some expert in photography. We might suggest his procuring a work on "Lantern Slides and How to Make Them," by one Dresser, price 75c. and another book on the same subject, by one Elmerdorf, price $1. These probably can be obtained from any house selling photographic supplies. We have also replied by letter.

How Much Power?

Editor Textile World:

On account of changes in our plant transferring yarn department to another building, it becomes necessary to find out the power needed for the following machinery:

3 sets 60" cards,
8 mules, 306 spindles each,
1 burr picker,
1 duster,
1 Fearnaught picker,
1 2-cylinder garnett machine twisters, spoolers, reels, etc.

We should be much obliged to you if you will give us your valuable opinion in this direction either by mail or in the next issue of the Textile World.

K. K. K.

We estimate that the power required for operating above machinery to be, approximately as follows:

picker	5 h. p.
3 sets cards	15 h. p.
8 mules	32 h. p.
duster	1 h. p.
Fearnaught picker	5 h. p.
Garnett	6 h. p.
twisters, spoolers, reels, etc	8 h. p.
total	75 h. p.
line shafting and connections	25 h. p.
total	100 h. p.

We also think it would be well to allow a margin of safety of from 10 to 25 h. p. more. The burr picker would take from 5 to 8 h. p. acording to size. If it was a 48", it would likely be 8 h. p. You do not say what kind of duster. If a small waste duster without fan, 1 h. p. would probably be enough. If a large woolen duster with exhaust fan, it would probably take 5 h. p.

Softening Process.

Editor Textile World:

Can you inform me of a good fast black softening process for cotton hosiery?

Pennsylvania. J. D. O.

We would suggest writing to the dyestuff houses that advertise in this magazine, who may have something of value to communicate. Passing the goods through a Turkey Red oil, or similar substance, is used to good advantage for softening products, after dyeing with aniline blacks. If our correspondent's color is an aniline black, the goods may be softened in the soaping bath, with an olive oil emulsion. We have one formula, which calls for wetting the hosiery with two per cent. sal soda, one per cent. Tur-

key Red oil, and then dyeing in the usual way. The last rinsing water is made hand warm, one per cent. Turkey Red oil added, and the goods worked ten minutes. There are other formulae which can be obtained, as we have before stated, from our advertisers, no doubt.

Posselt's Books.

Editor Textile World:

Will you please give me a list of textile books sold by you published by E. A. Posselt?

Alabama. J. L. W.

We quote E. A. Posselt's books on textile subjects, as follows: Textile Calculations, $2; Technology of Textile Design, $5.; Textile Machinery, Relating to Weaving, $3.

Wool Tint on Hosiery Goods.

Editor Textile World:

Can you give me information for obtaining a wool tint, or creamy tint to look like wool on mixed cotton and wool hosiery?

Mass. B. T.

We would suggest writing to the dyestuff houses that advertise in this magazine, as we are quite sure that our correspondent will receive from many of them valuable information.

Books on Cotton Manufacturing.

Editor Textile World:

Will you kindly inform me what in your opinion are the two best works treating cotton manufacturing, from a technical standpoint, and also its history as an industry.

Georgia. W. L. P.

Joseph Nasmith's Cotton Spinning, and W. S. Taggart's Cotton Spinning are two good works on the technical side of cotton manufacture. In regard to the history of this industry, there is no recent work published. The best work, by far, referring to American history, is the work published in 1856, by the Riverside Press, Cambridge, entitled "Textile Industries of the United States," by Wm. R. Bagnall. Only one volume of this work has been published, covering the period from 1639 to 1810. It is uncertain when the complete work will be published. "Cotton Manufacture in the United States," by Samuel Batchelder, published in 1863, is a small book of 108 pages, but it is a standard authority. "History of the Cotton Manufacture of Great Britain," by Edward Baine, published in 1835, and "Ure's Cotton Manufacturing," in two volumes, brought down to 1851, are also standard works.

Canton Flannel and Bed Ticking.

Editor Textile World:

I would like to become thoroughly acquainted with the manufacture of canton flannel and bed ticking. Can you inform me where I can read the matter up?

Penn. C. N. C.

There is no book devoted to this subject, except in the general study of cotton manufacturing. If any of our readers know of anything that will satisfy our correspondent, we should be pleased to hear from them.

Incandescent Lighting.

Editor Textile World:

I have an arc light dynamo which has been running six arc lights, each lamp requiring 40 volts and 18 amperes. How many 110 volt incandescent lamps can I run with it and how should they be connected so as to do away with the arc lamp?

New York Mills, N. Y. A. B.

The arc light machine referred to as a six light dynamo would in all probability deliver not more than nine amperes and forty volts to each lamp, in which case the machine would be a 120 volt, 18 ampere dynamo, see Fig. 1.

For incandescent lamps, the machine should be connected as shown in Fig. 2, and would then run 36 lamps of 16 candle power, under a pressure of 120 volts, the lamp being connected in multiple across the line. If, however, each lamp actually takes 18 amperes and 40 volts, as shown in Fig. 3, it is a 240 volt, 18 ampere machine. In order to connect incandescent lamps on this arrangement it would be necessary to connect two in series across the line, and by this arrangement 72, 16 c. p. lamps could be connected within the capacity of the machine, as shown in Fig. 4.

It would be necessary to run the dynamo at a slightly reduced speed in order to keep the pressure down to 110 volts per lamp in either case. As the arc machine is series wound, it will not regulate well for incandescent lamps, that is, if all the lamps were burning and a portion would be turned off, the remaining lighted lamps would probably be burned out by the excessive pressure; nevertheless by varying the speed you could get the desired illumination.

Starting Compound Engines.

Editor Textile World:

Will you give the method of starting a large compound condensing engine with direct connected jet condenser?

Higginsville, Mo. H. H.

Proceed in precisely the same manner as for any other engine up to the time of opening the throttle. Open the auxiliary

injection valve, and give steam enough to turn over slowly. Work up to speed, gradually opening main injection valve as engine takes more steam.

In shutting down, close main injection valve first.

The proper amount of injection water may be regulated by the vucuum guage, which will indicate the requirements very promptly. Another way is to have the temperature of the condenser casting at the place where the condensation takes place slightly warm to the hand when placed upon it.

Changing the Speed of Engine.

Editor Textile World:

Is there any way to change the speed of an Allis-Corliss engine without altering the size of the governor pulley?

Chicago, Ill. H. C. T.

The speed of an engine having a fly ball governor may be varied within certain limits by hanging weights on and increasing or decreasing the leverage of weights which may be there, for that purpose.

The principle is that the balls revolve in a plane corresponding to the work which they have to perform—viz: overcoming their own weight which is subject to, and the weight and friction of the valve gear which is not, subject to centrifugal influence, as are the balls themselves.

Thus if dead weight is added, the balls will revolve in a lower plane and the point of cut-off and speed correspondingly increased.

If weight is removed the governor, having correspondingly less work to do, will revolve in a higher plane, and the point of cut-off and speed will be reduced.

New Publications.

Cassier's Magazine for March, New York. Cassier's Magazine Co., price 25 cents per number. The articles in this number are well selected, and embrace those upon The Building of a Ship—its design, construction and general machinery equipment; Can Coke be Used as a Smokeless Fuel?—the conditions of successful use under boilers; The Dangers of Tall Steel Structures—a matter of general construction; The American Naval Officer of the Future—a fighting engineer.

Appleton's Popular Science Monthly for March, New York, D. Appleton & Co. Yearly subscription, $5. This number has the sixteenth article on the Principles of Taxation, by Hon. David A. Wells, taking up that part of the subject relating to Choses in Action. The other leading articles are as follows: Aspects of Nature in the Sahara; The Racial Geography of Europe; The Great Sierra Nevada Fault Scarp; Physical Training in the Colleges; The Academy of Natural Science of St. Louis; An Apostate Democracy.

Nitrazol C. This product is diazotized para-nitraniline in a dry powdered form, sold by Wm. J. Matheson & Co., 178 Front St., New York, who have issued a color pamphlet relating to it, in which manufacturers should be interested. This product is absolutely staple, and its use obviates the necessity of nitrite of soda and muriatic acid. A simple solution of Nitrazol C in water is the only operation necessary for its preparation and use.

Mushrooms of America, Edible and Poisonous, part 5, Washington, D. C. A. R. Taylor, 238 Massachusetts Ave., N. E., price 50c. per part. We have just received this pamphlet, or students' handbook, of 24 pages, beautifully illustrated in colors, on mushrooms of America, by Dr. Thomas Taylor, who for many years was connected with the Department of Agriculture, Washington, as microscopist, and whose name is well known for original scientific investigations.

Bureau of the Statistics of Labor, State of New York. The annual report of the Bureau of Statistics of Labor of the State of New York for the year 1896, has just been issued by that State. This volume is devoted to the question of wages in various industries; to wages paid in similar employments in foreign countries; to the differences in wages paid to organized and unorganized workmen, the hours of work, time employed, and cost of living, including wholesale and retail prices of all necessities; the cost of production and value of gas and electric light; to the investigation of wages, conditions and treatment of the unorganized working women in New York State; and other timely topics, though late in being published.

Industrial and Labor Statistics. The commissioner of industrial and labor statistics, Augusta, Me., has just issued his annual report for 1897, consisting chiefly of the compilation of statistics relating to the cotton, the woolen and the boot and shoe industries, and facts and statistics of the summer tourist business of the State. The latter investigation, while necessarily incomplete, taken in connection with that made in 1893 under the resolve of the legislature, gives the volume of business coming to Maine through her summer resorts, of a great and growing importance and extent.

Labor Statistics of North Carolina, for 1897, of the Bureau of Labor Statistics of North Carolina, including the first annual report of the inspector of mines, has just come to hand, containing much matter of interest relating to the textile industries of that State. The statistics referring to the cotton, woolen and hosiery mills of that State are quite full. Of course, the value of these statistics and that of the Bureau itself, depend very largely upon the character of the commissioner that is at its head.

Dyestuffs. This is the title of a new publication devoted to the dyers and colorists, published by Wm. J. Matheson & Co., Ltd., dealers in dyestuffs, New York. The first number appears in small quarto form, of eight pages, with colored covers, and contains many articles of decided interest to dyers, with special reference to the dyes that are sold by this house. Its general get-up is neat, and its typographical effect is excellent. This is an exemplification of the enterprise of

this well known house, and we take pleasure in commending it to the attention of manufacturers and dyers. Sample copies will undoubtedly be sent to anyone, upon application.

The Link-belt Machinery Co., Chicago, Ill., have recently issued some very attractive catalogues, relating to their products, showing modern methods for mining and handling coal materials, etc. for preparing coal by means of shaking screens and picking tables; and the Lubrig system of washing and classifying coals; and power transmission and machinery. Those interested in these subjects would do well to send to this company for their catalogues. Among the illustrated machinery described in these catalogues may be mentioned the independent electric coal mining machinery, breaker rolls, coal screens, ventilating fans, crushers, picking tables, etc. The shaking screen referred to, screens coal thoroughly, and facilitates the loading of box cars, making possible the addition of a larger percentage of small coal to the lump and egg sizes, without affecting their selling price. The link belt sold by this house is well known throughout the United States, as it is largely used for the Transmission of power, and an important adjunct to labor saving machinery for handling certain cereals, and raw and manufactured products.

The Cotton Industry, by M. B. Hammond. Published for the American Economic Association by The Macmillan Co., New York. Price $1.50 per part This is an easy essay in American economic history, on the cotton industry, in two parts, by the assistant in economics, University of Illinois, and to which extended reference was made in our last December number. Part 1, which is the only part published as yet, is devoted to cotton culture and the cotton trade. The essay is based upon research work carried on chiefly in the libraries of New York and Washington, and correspondence and interviews with men engaged in the cotton trade in New York City, and a tour of inquiry and investigation in the cotton States in the autumn of 1895. The contents of Part 1 may be better comprehended when it is stated that it is divided into chapters on The Introduction of Cotton Culture into the United States; The Influence of Cotton in the Preservation and Extension of Slavery; Southern Agriculture; Southern Agriculture Since the Civil War. History of the Cotton Trade; Evolution of the Cotton Market; and Statistics of Production and Trade.

Industrial News.

—The Berlin Iron Bridge Co., East Berlin, Conn. are furnishing and erecting a steel bridge, with a span of 90 feet, for the Bristol & Plainville Tramway Co., near Plainville, Ct. This company is building a new boiler house roof over the Coe Brass Manufacturing Co., Ansonia, Conn. The Hartford City Gas Light Co., Hartford, Conn. have placed another contract with the Berlin Iron Bridge Co., for one of their steel roofs, lined with their anti-fire proof roof lining, which has given eminent satisfaction wherever used.

The Laurel Mills Manufacturing Company, Roswell, Ga., at their annual meeting, elected all the old officers, S. Crowley, president. The management for the past year has been very successful, a profit of 21 per cent. being made, and a dividend of 8 per cent. was declared. This is one of Cobb county's best manufacturing industries. It is a woolen mill, and the outlook for continued good business is fine.

—The W. S. Haines Co., 136 So. Fourth Sa. have sent us a unique sort of a postal card, in the form of a shipping tag, to which is attached a leaden bullet, and on the face appears "Our First Shot." On the reverse side it reads: "Your pipes stay clean, clear, hot, if the Heintz steam trap is used where it is needed. Valve wide open while cold, closed tight at 212°. Every drop of condensation escapes. Shall we tell you why over 75,000 were sold last year? Ask for our Booklet."

The Cincinnati Street Railway Company has closed a contract with the General Electric Company amounting, it is said, to over $100,000. It covers the necessary electrical apparatus to enable the Cincinnati Company to change over that portion of its system now driven by cable to an electric system. The Boston Elevated Railway has also placed a contract with the same company for electrical apparatus amounting to the same sum.

The Standard Aniline Co., 122-124 Arch St., Philadelphia, represent that they have most excellent dyes for black on wool and cotton. We would call attention to their advertisement in this issue. A test of all their colors is made, and the value of the materials is guaranteed to the trade. The three per cent. Fast Acid Black, for wool and silk, has in all instances given excellent results, as producing a deep, rich shade, and does not smut. Small sample orders will be sent at a cost of 80c. a pound; and in order that users may be able to test this dye for themselves, the express or freight charges, however far the distance, on first ten pound lot will be paid. The four per cent. Fast Cotton Black is a fine and fast dye, i. e., it is fast to light, soap and acid, and does not smut. Manufacturers might find it to their advantage to write concerning these dyes.

The firm of Jaeck Bros., manufacturers and importers of dyestuffs and chemicals, has been changed to The Jaeck Bros. Company. The address remains the same and they invite attention of textile manufacturers to their very full line of goods.

—The Ontario Spinning Co., manufacturers of cotton hoisery yarns, Philadelphia, are replacing all of their Platt cards with new ones of the same make. They have recently started up a new Universal winding machine, and expect to run on high grade hosiery yarn.

—Last February, W. E. Hershey, General Manager of the Harrisburg Foundry and Machine Works, Harrisburg, Pa., severed his connection with that company, and W. R. Fleming, of the firm of W. R. Fleming & Co., of New York, Boston and Philadelphia, was elected to the vacancy, as vice-president and general manager. These works contemplate considerably increasing their facilities for making automatic engines for electric service, and they intend to add several new lines of engines, so as to broadly cover the whole field of steam engine practice. It is also understood that the company will rebuild their entire plant, upon a plan and scope which will place that concern in a superior position for

making their machinery, which is well known throughout the country.

—Richard Eckersley has secured the Philadelphia agency for the Franklin Needle Co., Franklin, N. H., and is prepared to fill orders promptly for their well known line. Mr. Eckersley makes a specialty of all branches of repairing knitting machinery and makes cylinders and dials, of every description, to order.

—The Link-Belt Machinery Co., of Chicago, who make a speciality of all matters relating to rope transmission, have a rope dressing which prolongs the life of rope very materially, and is easily applied, being put up in the form of three pound sticks.

—"Friction and Lubrication" is the title of a pamphlet issued by the Joseph Dixon Crucible Co., Jersey City, N. J. As its name indicates, it is a compendium of information of these subjects. It contains some facts and tables bearing upon comparative tests of oil and graphite, which will bear careful perusal by manufacturers and master mechanics.

—The stop motion for spring needle knitting frames, which has been introduced by A. White, 8 Weston Ave., Lowell, Mass., is meeting with very good success. He has recently had a large order from the Otis Co. at Ware, Mass. The Glenark Mills at Woonsocket have all their machines (about 400) equipped with this stop motion. We have seen it in operation and the principle is most ingenious yet perfectly simple and effective. When the yarn breaks, the motion is stopped practically instantly, before any stitches are dropped, but an equally important feature is the ease with which the stop motion is reset again. With all other spring needle stop motions, with which we are familiar, the resetting is quite a delicate and time taking operation, but with this device it takes no longer to set it and run the thread in than if the stop motion were not on. There have been so many failures in this direction that the chief difficulty Mr. White finds is to overcome manufacturers' doubts and get an opportunity to put the device on trial. Once this is accomplished, there is usually very little difficulty in securing an order.

—The Nashua Mfg. Co., Nashua, N. H., is putting in a number of Northrop looms, made by the Draper Co., Hopedale, Mass.

—The additional new worsted spinning machinery of A. J. Cameron & Co., Philadelphia, is now all set up, and the new combing plant will soon be complete, as the order for the combs, etc., is now pretty well advanced. The machinery is of the most approved kind. This concern has its Boston office in the Hathaway Building, 620 Atlantic Avenue, in charge of Mr. Isaac N. Slocum.

—A new chrome mordant (Amend Process) is meeting with flattering success wherever it has been used, showing a saving of steam, dyestuffs, and improving the quality of the fibre, and the color. It is sold by the Amend Process Co., 205 Third Ave., New York City, whose advertisement appears in this issue.

Decorations to be Fireproof.

One of the interesting precautions against fire which will be adopted by the managers of the Massachusetts Charitable Mechanics' Association for its fair in the big Huntington avenue exhibition building this fall will be specially intended to prevent a repetition of any such terrible disaster as that which occurred in a Paris bazaar last summer. It consists in the practical fire-proofing of all fabrics used in the extensive decoration for the great halls, so that, if any part of these festoons and draperies happened to come in contact with fire, it would not burst into flame. At most, it could only char.

Secretary Henry D. Dupee, for the committee, in a statement regarding the plans regarding decorations, says: "The partial destruction of the Saratoga street Methodist Church in East Boston, which was caused by a gas-jet coming in contact with draperies, which were being festooned in preparation for a concert, calls to mind what a terrible panic might have ensued had this happened during the festivities. Again, it brings vividly to our minds the horrible destruction of life at the burning of the great bazaar in Paris, and a more recent loss from the same cause in Chicago, by the destruction of the great exhibition building. The executive committee of the twentieth triennial exhibition of the association, as early as last December, took steps to prevent any occurrence of this kind at their coming exhibition, steps which we hope will be copied by all decorators throughout the country, as there is absolutely no necessity for fires arising from causes as above mentioned. We have made a rule which will be strictly enforced, that all fabrics used in the decoration of exhibits must be treated with a solution of tungstate of soda. Since making this rule, we have, through the efforts of our chemist, formed a still more simple and efficacious material with which to impregnate the fabrics, making them slow-burning and absolutely impossible for a blaze to arise on fabrics treated by this method, which is simple and effective."

The association is trying to make arrangements so that textiles for decoration, properly treated with fireproofing solution, may be obtained through some Boston business house. The cloth, as it comes from the mills, can be ignited in a flame with a lighted match, but the same cloth, treated with the chemical, refuses to kindle when touched by the flame from the match, and merely crumbles and chars, without flaming.—[Boston Transcript, March 5, 1898.

New England Cotton Manufacturers.

The Sixty-fourth meeting of the New England Cotton Manufacturer's Association will be held in Chipman Hall, No. 88 Tremont Street, near the corner of School Street, Boston, on Wednesday and Thursday, April 27th and 28th. The sessions will be held during the day, leaving the evenings free for such other engagements as the members may make.

The Board of Government has recently decided to issue a certificate of membership to each member. They are now in the engraver's hands and will be mailed perhaps by April 1st. The certificates will be about sixteen inches high and twenty-one inches wide and similar to those of the leading Engineering and Technical Societies of this Country and Europe.

A Belt Dressing.

It is the slipping heel that wears the hole in the stocking, and it is the slip-

ping belt that wears the leather. Belts that slip not only do not drive properly, but they wear out rapidly. A belt that is too tight is over-strained, and will also wear out rapidly. A thoroughly reliable belt dressing is therefore a necessity in every well regulated factory, and probably no dressing has a better established reputation than Dixon's belt dressing and leather preservative. As long ago as 1878 it was used on the big driving belt at the Paris Exposition, when every other means had failed to make the belt take hold of the pulley that was to start the thousands of feet of shafting and hundreds of machines. It is made only by the Joseph Dixon Crucible Co., Jersey City, N. J., who are known the world over for their graphite products.

An American Worsted Spinner.

The Lowell Machine Shop, Lowell, Mass. has placed before the worsted manufacturers of this country, the first American made worsted spinning frame, which, it is claimed, is as perfect in construction and efficiency as any foreign machine of the kind. One of these machines of 144 spindles has just been completed and set up in the Massachusetts Mohair Plush Company's plant, Lowell. It appears that the Lowell Machine Shop has not attempted to depart from the well established lines of the English manufacturers of this class of machines, but will make those which will run side by side and be interchangable with such as all mills are now using. Frames of any number of spindles, for any length of machine can be supplied at short notice. This company is in a position to take orders for open can and two-spindle gill boxes, way boxes, and drawing boxes with any number of spindles; also, the dandy roving and reducing frames, with any number of spindles. We understand that the company will soon issue a catalogue of their new machinery, which will be distributed to all those interested in the manufacture of worsted fabrics.

Adding a Line of Anilines.

Convers B. Finckel, who has for a number of years past been connected with the Philadelphia Textile School, in charge of the department of chemistry and dyeing, has recently accepted a position as chemist with the firm of O. S. Janney & Co., of Philadelphia and Boston. Mr. Finckel brings to his new position thorough technical knowledge and wide analytical experience. O. S. Janney & Co. are adding a line of aniline and alizarine colors to their business. They have for many years been among the largest dealers in indigo, dye-woods and natural dyestuffs and chemicals, and, in adding this new line, they will be able to supply the varied requirements of their large line of customers.

Yorkshire Boiler Composition.

This is the name of a compound introduced in this country from England by the Carr Mfg. Co., 22 Medford St., Boston. It has been used abroad with great satisfaction for half a century, and is claimed to be a thorough remedy for the prevention and removal of scale and incrustation from steam boilers. It is purely vegetable, and the manufacturers assert that it contains no injurious ingredients. In these enlightened times, no argument should be needed to demonstrate the advantage, indeed the necessity of keeping the boiler free from scale. It has been demonstrated beyond question that the amount of coal burned to maintain steam at a given working pressure increases in rapid ratio according to the incrustation. Not only that, but as greater heat is required, the effect upon the boiler is greatly injurious and diminishes its life. The Yorkshire boiler composition is in use in hundreds of establishments in this country, and even a partial list is a most imposing display. The company invites correspondence and will be pleased to give further information and submit samples, etc.

Camden Water Wheels.

The Camden Water Wheel Works, Camden, New York, are well known throughout this country and in many parts of Europe, and their wide spread reputation for uprightness has caused all who have dealt with them to feel a confidence and willingness at any time, when necessary, to deal with them again, as they have the reputation of giving people what they buy, or think they are buying. Their wheels are very durable, and have great efficiency of power and have no superior for the economization of water. They build four different styles of turbines adapted to different streams and locations, as no one wheel is suitable in all respects to meet the conditions found in different streams. W. Q. Percival, the inventor of their different turbines, has made it a life study to this purpose, and has demonstrated all his different principles in their practical application. He says that no man or company can afford to deceive his customers or the people, but must have their confidence to maintain their business in the future.

Briton Richardson.

Briton Richardson, secretary and treasurer of the Silk Association of America for the past twelve years, died of pneumonia on March 3 at his home in East Orange, N. J. Since last October, when he was compelled to abandon work of all kinds, Mr. Richardson had been ill. Last December he made a trip to Europe in the hope that the sea voyage would prove beneficial, but he returned unimproved. Since then his decline has been gradual. The end was precipitated by a severe cold which he contracted seven or eight days ago. He was an extreme protectionists, and to a greater extent than any other person, perhaps, he was instrumental in securing the enactment of the silk section in the Dingley law which closed our ports to so many foreign silk fabrics.

The deceased was a native of Manchester, Eng., and was nearly 80 years of age. He came to this country when 38 years old. In 1863 he engaged in the raw silk business, first as a broker and later as an importer. As secretary and treasurer of the Silk Association of America, Mr. Richardson commanded the respect and confidence of the entire trade.

Mr. Richardson leaves a widow, two sons and a daughter. He was a member of St. George Society in Brooklyn, of the Republican Club of New York, and the first president of the Merchants' Central Club.

Lowell Textile School.

There has recently arrived at the school an interesting contribution from a firm of machine builders in Alabama, the Daniel Pratt Gin Co., namely a cotton gin for the purpose of separating cotton fibres from the seed. This will shortly be put in operation and the cotton department will then be in possession of all the machinery necessary to manufacture the fibre into yarn from the seed cotton. The equipment of worsted machinery has now arrived at the school. This consists of all machinery necessary to make worsted yarn from tops and is the gift of Prince, Smith & Son, of Keighley, Eng. and their agents, Stoddard, Haserick, Richards & Co., of Boston. The worsted card which has to operate along with this machinery is now being built at North Andover and will be contributed by Davis & Furber. A. S. Lyon of the Lowell Mfg. Co., and Franklin Hobbs assistant treasurer of the Arlington Mills, Lawrence, were largely instrumental in obtaining these donations for the school. Director Brooks is having the machinery put in operation.

Electric Illumination.

The illumination of the grounds and buildings of the great exposition for which Omaha is now preparing will be made on a scale of magnificence unexcelled even by the wonderful effects obtained at Chicago in 1893. Not less than 2155 Kilowatts in dynamos and transformers have already been ordered from the General Electric Company, for purely illuminating purposes. In detail, the contract covers four 125, 2000 C. P. Light Brush Arc Dynamos, of the multicircuit type; four 120 K. W., and two 180 K. W. alternating current, high periodicity dynamos; operating at 1040 volts, together with 840 K. W. in type H transformers of different sizes. Current for various power purposes will be supplied from a generator of 225 K. W. capacity operating at from 500 to 650 volts. The arc lamps will number 60 of 2000 candle power each. These are to be of either the double or single carbon type, at the option of the General Electric Co., but, if the latter are used they are to be arranged for 14 hour service. The contract also calls for the necessary exciters and all the switchboard appliances for the operation of the above machines.

Boss Knitting Machine Works.

The rapid growth of the business of the Boss Knitting Machine Works has necessitated their removal to new quarters in Reading, at the corner of Elm and Reed Sts., where they now occupy their own large five-story brick structure, built by themselves. This gives them four times their former capacity, and as their new quarters are thoroughly equipped with all the special machinery needed for the conduct of their business, they are prepared to fill their orders promptly, and with better satisfaction than ever before. Business is very good with them, and they are working full time, turning out orders for their popular 3/4 and 15/16 automatic seamless hosiery machines.

Increasing Facilities.

Owing to the numerous orders received by Messrs. Bamford & Smith for their dust-proof and self-lubricating spinning tubes, they have been obiged to add new machinery to fill the demand. The most gratifying feature is that a large share of their present business is duplicate orders, which shows that the worsted spinners appreciate a good thing, especially when it is reasonable in price.

Their advertisement on another page, shows an illustration of their device, and explains some of its good points.

MILL NEWS.

Cotton.

New Mills.

—Alabama, Huntsville. Regarding the proposed new cotton mill to be built here by Eastern parties at the cost of $200,000, a committee, consisting of T. W. Pratt, J. R. Boyd and Oscar Goldsmith, has been appointed to raise $10,000 to be offered as a bonus.

—Alabama, Florence. It is reported that F. M. Perry, a local business man, has purchased twelve acres of land, with a water power, and about a dozen buildings. He will make such alterations as are required to fit out a large cotton mill. The total cost will be about $100,000. The product will be cotton yarns, and possibly rope. The water power is said to be valuable. The price for the land and power was $10,000.

—Georgia, Greensboro. A cotton mill is talked of for this place, and E. A. Copeland and W. R. Jackson are mentioned as interested parties.

—Massachusetts, Westfield. The J. E. Brown Mfg. Co., of Holyoke, will make comfortables and quilts. It is reported as considering the removal of their plant to Westfield. It is hoped that the people will subscribe $25,000 in stock. Ira Miller, J. D. Cadle and G. E. Austin represent the Board of Trade of Westfield.

—Massachusetts, Westfield. The Westfield Mfg. Co. has been chartered with capital of $10,000, J C. Perkins, president; W. M. Waite, treasurer, to make yarns and threads at this place. It is understood that machinery will be moved from West Stafford, Ct., and that about 25 hands will be employed.

—Mississippi, Jackson. T. McCleland is reported to be interested in a project to build a cotton rope mill here, and would like information regarding equipment.

—New York, Patchogue. Sketches have been drawn by George P. Chappelle, 24 State St., New York City, for one story lace factory to be built at this place. We do not know whether this is to be an

addition to the plant of the Patchogue Mfg. Co. or for a new company.

—*North Carolina, Spray. The new Nantucket Mills inform us regarding their new building that foundations were started March 21st. Product will be cotton cloth. They will employ about 125 hands, use water power, have a dye house, and equipment will include 300 looms. We understand that this is to be simply a weaving mill, and that yarn will be bought. J. M. Worth, president; J. S. McAllister, treasurer.

—*North Carolina, Troy. The Smitherman Cotton Mills have been incorporated by W. E. Capel, S. J. Smitherman and others. Their plant, which was mentioned several months ago, is now starting. It consists of 2080 spindles, with 80 looms. Capital stock $50,000. W. E. Capel is treasurer and secretary, and Frank Page, superintendent.

—*South Carolina, Clio. The machinery for the Red Bluff Cotton Mills will soon be put in. The mills will have 5000 spindles. J. N. Mallonee is treasurer.

—*South Carolina, Fountain Inn. The company which will build a cotton mill here has organized with the following directors: J. W. Shell, H. L. Shore, J. A. Cannon, A. S. Peden, and J. W. Givens. The plant will be about 6,000 spindles, and the product cotton yarns. Capital probably $75,000. J. W. Given should be addressed for further particulars.

—*South Carolina, McColl. A new cotton mill will now be built here, and it is understood that the interested parties are largely stockholders of the McColl Mfg. Co., which operates a 7500 spindle mill here. This project has been mentioned previously, and the name of the company will probably be the Beaver Dam Mills. It will probably contain about 5000 spindles, and will be under the management of Charles Iceman, who is also superintendent of the McColl Mfg. Co.

—*Texas, McKinney. J. Perry Burrus informs us, in reference to the proposed new cotton mill, that nothing definite has been done at the present time. The matter will probably not go forward until the water work system is completed, which will not be before next autumn or winter.

—Texas, Pittsburg. This city is desirous of having a cotton mill ,and offers to raise $25,000, if practical manufacturers will put in an equal amount, making a capital of $50,000.

—*Texas, Wetherford. We understand that $60,000 has already been subscribed for a new cotton mill here. W. E. Fant, cashier of the First National Bank, is interested. $15,000 more will have to be raised before the success of the project is assured.

Enlargements and Improvements.

—Arkansas, Mammoth Springs. The Mammoth Springs Cotton Mill has recently added 5000 spindles and 125 looms.

—*Georgia, Griffin. Regarding the enlargement to the plant of the Kincaid Mfg. Co., James M. Brawner, treas., informs us that plans are not yet perfected but that they expect to build and equip during the summer and fall an addition of about 6,000 spindles with looms to match.

—North Carolina, Charlotte. It is reported that the Dover Yarn Mills contemplate increasing their plant. At present they operate 5,300 spindles.

—North Carolina, Dallas. The Dallas Cotton Mills will probably put in spinning frames to take the place of 116 looms, which are now idle. Their 2080 spindles are running their full capacity.

—*North Carolina, Fayetteville. The Holt-Williamson Cotton Mfg. Co., recently incorporated with a capital of $60,000, is enlarging the Phoenix Cotton Mill, which they have bought. The addition will be about 1-3 the size of the present building.

—*North Carolina, Harden. The Harden Mfg. Co. state that they are putting in some twister spindles and expect to add some more as soon as they can enlarge their building. They will also put in a finisher lapper. O. D. Carpenter is secretary and treasurer.

—*North Carolina, Lincolnton. The Long Shoals Cotton Mills confirm our recent report that they are to add new machinery, but state that no new building will be put up. 50 to 75 hands will be employed. Their product is cotton yarns, single and ply. This mill is located at Long Shoals Station.

—North Carolina, Rockingham. We note a report that the Pee Dee Mfg. Co. has decided to build a duplicate plant, which would increase their spindles by about 6000. W. C. Leak, president.

—North Carolina, Wilmington. The Wilmington Cotton Mills will double the capacity of their plant. A new boiler will be put in and 80 Crompton & Knowles looms have been contracted for.

—*South Carolina, McColl. Regarding report of the new cotton mill here, the McColl Mfg. Co. inform us that they contemplate building an addition and adding 5,000 spindles, which would give them a total of 15,000. They would use steam power and employ 200 hands. President F. P. Tatum; treasurer, T. H. Gibson; agent, J. B. Pipkin and superintendent, Charles Iceman.

—*South Carolina, Union. The increase of capital stock by the Union Cotton Mills from $600,000 to $1,100,000 is to provide for the addition of 31,000 spindles and 866 looms, which will be put in before June 1, 1898. This mill is operated by steam power, and T. C. Duncan in president and treasurer; J. L. Hicks, superintendent. The selling agents are Carey, Bayne and Smith.

—*South Carolina, Yorkville. The York Cotton Mills confirm our recent report and state that they will put into their present mill 2,976 more spindles. They make two ply yarns, 30's to 50's. Their present equipment is 3,120 spindles and 1,600 twisters. Their capital now is $75,000 and they will increase to $100,000. E. B. Beard president; John R. Ashe, treasurer and agent; P. M. Grindes, superintendent.

—Virginia, Lynchburg. At the stockholders' meeting to be held March 25th, it will probably be voted to enlarge the mill from 21,500 spindles to 40,000 spindles, and 725 to 1400 looms. It is understood that C. R. Makepeace & Co., of Providence, R. I., will make plans. Max Guggenheimer is president.

Starting Up.

—*Alabama, Birmingham. On March 15th, the Avondale Cotton Mills were started up. The mills have 1,000 looms,

35,000 spindles, and give employment to 600 operatives.

—*Alabama, Cottondale. A corporation has been organized to operate the mill of the Tuscaloosa Mfg. Co., recently bought by D. L. Rosenau, of Northport, Ala. The name will be the Tuscaloosa Mills. Capital stock $60,000, all paid in. President J. Pollock; vice-president, Lewis Black; treasurer and secretary, D. L. Rosenau. The mills will be put in operation at once and new machinery added. Product will be cotton plaids of fine quality.

—*Connecticut, New Haven. New England Warp Co., recently incorporated, with a capital of $5,000, started its plant March 1st, making cotton warps of high grade. William W. Post is president and treasurer; T. H. Matthews, superintendent; T. E. Davies, secretary. They sell direct. Use steam power.

—Rhode Island, Olneyville. We have authentic information that the Merino Mill has been purchased by a new company known as the Joslin Himalaya Co. Capital $100,000. President, William E. Joslin; secretary and treasurer, Charles T. Aldrich; business manager, William T. Aldrich. The product will be shoe and corset lacings and notions. The 12,000 cotton spindles now in the plant will be operated and braiding machines put in to replace the looms, which are being removed and sold. This mill has a dye house and uses steam and water power. The company will sell its product direct, and expects to have the plant running about April 15th.

Mills Shutting Down.

—*Connecticut, Willimantic. The Windham Cotton Mfg. Co. closed down its works, March 19. It is understood that the shut-down is connected with the settlement of the estate of Matthew Watson, who is one of the principal owners.

Woolen.

New Mills.

—Minnestota, Fosstom. A company has been organized here with $15 000 capital, for the purpose of erecting a woolen mill. The interested parties are S. S. Stadsvold, L. W. Larson, Lewis Lohn, and Samuel Sutor. They expect to have the mill in operation in time to handle the spring wool clip.

—*North Carolina, Albermarle. The Wiscasset Woolen Co., recently reported as organized here, has elected the following officers: J. W. Cannon, president; John C. Leslie, secretary. $200,000 capital was asked for, but $229,700 have already been subscribed, and the capital stock has been increased to $250,000. The work of building the mill will probably be started very soon.

—*New York, Niagara Falls. The Niagara Falls Power Company has announced that Alex. Morton & Co., large carpet manufacturers, of Darvel, Scotland ,are to build a plant here, and take power from the company.

—Pennsylvania, Philadelphia. The Jas. Dunlap Carpet Co. are to build a one-story brick building 102 by 309, with a boiler house 46 by 52, at the southwest corner of 56th Street and Lancaster Avenue. J. S. Cornell & Son have the building contract.

—*P. Q., Way's Mills. The woolen mill of Shurtleff & Nunns will be rebuilt. It is undedstood that machinery has already been purchased, and will be put in as soon as the building can be erected.

—*South Carolina, Gaffney. The carpet mill, which has been previously mentioned to be operated by the new Gaffney Carpet Mfg. Co., expects to have its new building ready and the plant started some time next June. The product will be ingrain carpets, all wool and worsted, cotton and wool, and all cotton, also art squares. A dye house will be built. Capital stock is $60,000. President, treasurer and superintendent, J. E. Bierck. The equipment will include 59, 36 in. looms and art square looms.

—*Wisconsin, Genessee. James Proctor, whose mill was destroyed by fire Feb. 23rd, has decided to rebuild his mill.

Enlargements and Improvements.

—*Kentucky, Mayfield. The Mayfield Woolen Mils will be enlarged, as previously mentioned. About 60 new looms will be put in, and 100 new sewing machines. The company turns out manufactured clothing.

—New Hampshire, Peterboro. New machinery is being put in and repairs made at the Joseph Noones Sons' Co., and automatic sprinklers are to be put in.

—New York, Hudson. The Hudson Fibre Co. is putting in new machinery, which includes one Schaum & Uhlinger self-revolving hydro extractor and a new 75-light dynamo. W. H. Kennedy is superintendent. Several departments are running night and day.

—New Hampshire, Tilton. R. H. Hart, of Ashland, who bought the Tilton Mill property some months ago and is making yarn there, expects to build a new weave shed as soon as weather permits, and will put in 20 looms.

—Oregon, Union. The Union Woolen Mill Co. will build a dye house 44x46, into which some of the machinery now in the main building will be transferred.

—Pennsylvania, Mount Joy. We note a report hat George Brown's Sons are to put up a woolen mill here, employing sixty hands. Their plant which produces both cotton and woolen goods was damaged by fire in July, 1897.

—*Rhode Island, Harrisville. William Tinkham & Co. are building an addition to their mill, 150x50, two stories. They cannot say, at present, just what machinery will be put in.

Mills Starting Up.

—*Connecticut, Norwalk. The Norwalk & Fairfield Woolen Mills, which were recently incorporated with a capital stock of $100,000, will operate the mill formerly of the Union Mfg. Co., which assigned in March, '94, and later, was bought by W. F. Bishop. Repairs are being made, and the mill will be started soon. This is a 20 set mill, with 28 looms. Steam and water power. Worsted cassimeres will be made. Interested parties are Lewis Hollingsworth, recently superintendent at the National & Providence Worsted Mill, Providence, R. I., and Sidney W. Alberti, and it is understood that W. F. Bishop is also interested.

—*Maine, Dexter. It is now reported that the stone mill of the Dexter Woolen Mills property has been purchased by local parties. The company will have a

capital stock of $100,000, and be named the Penobscot Woolen Co. O. F. Ireland will probably be the superintendent.

—*Massachusetts, Blackstone. The No. 2 mill of the Waterford Mills, recently bought by Charles Fletcher, is now being started up. 50 looms have been started on worsted goods under the management of Joseph E. Fletcher, who is also manager of the Saranac Worsted Mills at Olneyville, R. I.

—*Pennsylvania, Spartanburg. As was recently reported, the Harvey Lamb woolen mill has been sold. The purchasers are M. L. Tauber & Son, formerly located at Gladdens, Pa. They expect to start the mill about May 10th, 1898. The product will be all wool flannels, skirts, shaker and plain black hosiery, half hose, ladies' and children's hose, and all wool blankkets.

Knit.

New Mills.

—*Georgia, Barnesville. The new knitting mill, recently referred to under the name of J. C. Collier Co., will be known as the Oxford Knitting Mills. Capital stock $15,000. President J. C. Collier; treasurer, F. M. Stephens; secretary and general manager, W. M. Howard; superintendent, William Gee; selling agents Batteson & Dowd, New York City. J. C. Collier Co. furnish $7,500 and Batteson & Dowd $7,500. The work on foundations has just been started, and they hope to have the mill run by June 1st next. Product will be high grade cotton underwear. Will use steam power, and have 20 knitting machines.

—Maryland, Cumberland. It is reported that A. L. Miller will establish a knitting mill in the building corner of Bedford and Mill Sts.

—*Pennsylvania, Bethlehem. W. H. Jacobs, who has taken the building formerly occupied by the Excelsior Knitting Machine Co., informs us that his plant will be known as the Hacyon Knitting Mills, which was started up March 9th, employing 50 hands on cotton and woolen half hose, operating 60 knitting machines by steam power. This is a new concern.

—Pensylvania, Danville. It is probable that the Danville Knitting Mill will have a new factory built, 40x80, three stories, which will give employment to two hundred hands. Their present quarters are not large enough. The town will be expected to raise $10,000 for the building of the mill. Thomas West, Plymouth, is largely interested in this mill.

—*Pennsylvania, Downington. The Walker-Evans Knitting Co. started its hosiery plant here Feb. 21st. The product is ladies' hosiery. They have 16 knitting machines. Use steam power. The capital is $2,600. Charles E. Walker and B. F. Evans are proprietors. The mill is located at East Downington.

—Pennsylvania, Marysville. A charter has been granted to a new company, to be known as the Marysville Hosiery Co., which will establish a new factory here.

—Pennsylvania, Philadelphia. Whitaker Bros. have established a knitting mill at 4800 Frankford Ave., Frankford, to make cotton seamles hosiery. They will put in 60 knitting machines.

—Pennsylvania, Minersville. A new knitting mill is reported for this place to be operated by J. E. and Charles Laubenstein, located corner of Carbon St. & Delaware Ave., product will be hosiery.

—*Pennsylvania, Nanticote. The new knitting mill here will be operated by Thomas West, of Plymouth, Pa., under the name of Black Diamond Knitting Mills Co. The citizens of Nanticote have subscribed $5,000 to build the factory building complete and Mr. West will put in the machinery. Product will be fine seamless half hose. About 100 machines will be put in at the start. Steam power used. The capital stock of the company is $15,000. Thomas West is treasurer. Probably the mill will start up about May 1st.

—Pennsylvania, Pottstown. A building has been leased here by J. D. Clemons, Jonas S. Wagner and H. M. Boone to be used as a hosiery factory. About 25 machines will be put in, employing 30 hands at the start. Building is located corner of York and Walnut Sts.

—Tennessee, Athens. The Tennessee Underwear Mill is being organized here to make ladies' cotton ribbed underwear. The authorized capital is $50,000, but only $10,000 or $15,000 will be put in the first year. W. Gettys, Athens, should be addressed.

Enlargements and Improvements.

—*New York, Buffalo. John C. Sanford, proprietor of the Fashion Knitting Mill Co., Buffalo, N. Y., will build an addition to his mil here, instead of removing to Arcade or Atica, as has been previously reported. He expects to complete this addition by May 1, which will give employment to 150 or more hands. He uses steam and water power, and has a dye and bleach house. The product of the mill is men's, boys' and ladies' ribbed goods, and Modestie union suits for misses and children, patented. When completed, he will have a total of sixty knitting machines, thirty of which are body and thirty sleevers. J. P. Stiles is superintendent.

—*New York, Cohoes. F. W. Kavanaugh & Co., who have succeeded A. Leroy & Son as managers of the Globe Knitting Mills, are to build an addition as previously mentioned, starting work April 1, and expect to have same in operation by June 1. They will put in 30 new knitting machines, operated by steam power, employing 100 hands. Product to be ladies' ribbed goods and men's fleece-lined underwear.

—*New York, Phoenix Mills. The addition recently referred to of the Index Knitting Mills, of which Theo Frelinghuysen is proprietor, will be completed by June 1st. Work on this addition will be started about April 1st, and when completed will employ about 25 more hands. 8 new cylinders are to be put in, and the product is men's and children's underwear.

—*New York, Utica. Kendall Knitting Co., of Broad St., confirms our recent report regarding their addition, and states that work on the foundation was started March 10th. When this is completed, 150 more hands will be employed, making ladies' and children's rib goods. The company uses steam power, and its officers are as follows: President, W. J. Frisbie, Camden, N. Y.; treasurer, G. A. Frisbie, Utica; secretary and superintendent, Charles A. Byington.

—*Pennsylvania, Mohn's Store. The Wyomissing Hosiery Co., who are to build an addition, expect to have same

completed about May 1st. This will give them a total of 100 knitting machines. Product is 84 and 160 needle goods. They have a dye house. Isaac S. Spatz and A. S. Homberger are the proprietors.

—*Ohio, Chillicothe. W. S. Rowan confirms our recent report regarding his purchase of knitting machinery formerly operated by the Famous Mfg. Co. His plant will be known as the Chillicothe Hosiery Mills, 411 Mill St., office at 38 West Water St.

—*Pensylvania, Danville. The Danville Knitting Mills Co., of which Thomas West of Plymouth is treasurer and W. Jos. Harrison superintendent, confirm our report made recently that they are to build an addition. Work will be started at once, and when completed 300 more hands will be employed, making men's fine hose. One hundred new knitting machines will be put in, operated by steam power, and probably a dyehouse built. The present plant is very busy with large orders.

—*Wisconsin, Appleton. The Appleton Knitting Co. confirms our recent report that an addition is being built 24x100, two stories. Work on foundation was started March 4th. The seven new 84 in. knitting machines will be put in, making a total of 23 machines.

Mills Starting Up.

—*New York, Fort Plain. The new mill of George A. Vosburgh has been started up. It will be known as the Diana Knitting Mills, as previously mentioned, employing about 100 hands, making ladies ribbed underwear in lisle, silk, worsted and Egyptian.

—*New York. Oriskany Falls. The Oriskany Falls Knitting Co., whose new mill has just been finished, has had same started, employing 250 hands. The capital is $75,000. The entire equipment is new and modern.

—New York, St. Johnsville. The Royal Knitting Co., of which J. H. Reaney is proprietor, started up March 7th. Equipment includes 75 knitting machines.

—*Pennsylvania, Myerstown. I. W. Forry & Son, hosiery manufacturers of Shamokin, started a branch here March 1st, employing about 50 hands, on fine guage half hose. They use steam power, and, as recently mentioned, George A. Martin is in charge.

Silk.

New Mills.

—New Jersey, Passaic. The Alexander Silk Co. is starting up with 75 Knowles looms. The product will be broad silks. William Ruegg is manager.

—Pennsylvania, Easton. R. & H. Simon, who at present operate an 18,000 spindle silk mill at this place, will erect two new mills here, each to be 160 x 60. At present they employ 800 hands, and their enlargements will require 300 more hands. Work on the buildings has been started.

—*Pennsylvania, Phoenixville. Johnson Cowdin & Co., silk ribbon manufacturers of Paterson, N. J., have completed arrangements with the Phoenixville Industrial Association to erect a large mill here at the cost of about $65,000, to be 30x50 feet, four stories, of brick, and the mills will employ about 500 hands. It is expected that the plant will be in operation by next October. Paul S. Reeves is president, and C. H. Howell, secretary of the association.

Enlargements and Improvements.

—*New Jersey, Paterson. Regarding the changes at the Lincoln Silk Co., the firm informs us that they are moving their Barnert Mills to Dale Mill, and will manufacture, in addition to tie silks, dress silk, taffeta and shoe upper silks. They will have 60 looms instead of 24. The company has been re-organized, but the name is not changed. The officers are now Joseph C. Paterson, president; Edward Kubie, treasurer and secretary. They will occupy 6,000 square feet of floor space.

Mills Starting Up.

—*Connecticut, Mystic. The Rossie Velvet Co., previously mentioned, was started up March 9th, employing 100 hands.

Miscellaneous.

New Mills.

—*Tennessee, Jackson. The Jackson Woolen Mills, destroyed by fire last August, will be rebuilt. They are makers of clothing, overalls and shirts. The mill will probably be started May 1st, employing 150 hands. 75 sewing machines will be put in. The company has a capital of $60,000. B. P. Cantrell is secretary and manager. All machinery contracts have been let.

Mills Shutting Down.

—New Hampshire, Meredith. The American Flax Manufacturing Co. has shut down its plant for an indefinite period.

Fires.

—Kentucky, Louisville. Fire occurred March 8 at the Falls City Manufacturing Company, causing a loss of about $25,000. This firm manufactures jeans and woolens.

Maine, Phillips. The woolen mill of Hiscock & Atwood was destroyed by fire March 7th. The plant contained two sets of cards, two looms and six knitting machines. Insurance was $3,000.

—Mexico, Pueblo. The La Carolina Cotton Mills at this place were recently destroyed by fire, loss being about $400,000, the mill being owned by Spanish bankers.

—New York, Cohoes. Fire occurred at the Victor Knitting Mill, March 15, which puts about 900 hands out of employment. No. 1 and No. 2 Mills were completely destroyed, but No. 3 Mill was saved. The company carries sufficient insurance to cover the loss.

—Pennsylvania, Philadelphia. The dyehouse of John Kitchenman, at York and Hope Streets, Philadelphia, was destroyed by fire recently, the loss being about $3,000 on stock and building. Insured.

—Pennsylvania, Philadelphia. The Oakdale Dyeworks, on York Street, west of Ninth St., were badly damaged by fire March 15, the damage, including loss on stock being estimated at more than $4,000.

Facts and Gossip.

—Connecticut, Mystic. The Mystic Manufacturing Co., which was organized last November, with a capital stock of $25,000, by H. A. Crowder, Eli Gledhill and others, has now been strengthened by admitting to the company Joseph H. Kay and John Stewart, who have been manufacturers in England.

—*Maine, Dexter. The White Mill of the Dexter Woolen Mills property has been sold to John Morrison, who was for many years boss weaver in Abbott's Mill. The price paid is given at $7,500. It is understood that the mill will be thoroughly repaired and an addition erected for a dyehouse and finishing room. Probably 50 or 60 hands will be employed.

—Massachusetts, East Brookfield. Edward G. Gibson has bought the factory at the South side of the B. & A. R.R., which is, at present, occupied by R. P. Grant. Mann & Stevens Co. are to take Mr. Gibson's present building after the first of May, when Mr. Gibson will move into his new quarters, and in addition to his present shoddy making equipment, will put in an extracting plant.

—Massachusetts, Lowell. Howard Stockton, treasurer of the Merrimac Mfg. Co., has written the local press regarding the rumor that the company was to build a new mill in the South: "I have had in my mind for sometime, the construction of a plant at the South, and recently the state of affairs has pressed the matter to my attention. As a preliminary step, Mr. Peade, agent of the mills at Lowell, is examining mill sites in Georgia and Alabama. Nothing, however has been settled. I have not yet a definite plan to submit to the directors, nor have I decided that it would be wise to recommend such a project."

—Massachusetts, Warren. Sayles & Jenckes have formed a corporation to operate their woolen mills here, under the name of the Sayles & Jenckes Manufacturing Co. President, Fred Sayles; treasurer, W. A. Jencks.

—*Minesota, Mankato. The Mankato Knitting Mills were sold March 18 by the assignee, Anton J. Busch, of Mankato, for $2,300. He represented the First National Bank of Mankato and the National Park Bank of New York, who were creditors of the company.

—Minnesota, Rushford. We wish to correct a statement which appeared in the February Textile World, regarding the assignment of the Rushford Knitting Mills. The Rushford Knitting Mills have not assigned, and there is no one in Rushford by the name of J. C. Nutting, who was reported to have bought the plant. The mills are not in debt, and on the contrary are in a very prosperous condition. They manufacture German socks, lumbermen's stockings, wool hosiery, mittens, and make their own yarn. D. T. Tew is president. A. E. Hazard, vice-president; L. Tagland, treasurer, and W. R. Putnam secretary and manager. It was the Northfield Mill which was in financial difficulty at that time.

—Missouri, Jefferson City. The California Woolen Mill Co. has been incorporated here. Capital stock $15,000. Incorporators, Frank Hemple, Frank Hugelman and Peter Herfuth.

—New Jersey, Millville. The Millville Manufacturing Co. have been running their bleacheries at night, because of a rush of orders. Their normal capacity is 25,000 pieces a week, but recently they have been getting out 40,000.

—*New York, Amsterdam. The United Knitting Mill has been sold to Caspar John, for $21,900, by the receiver John P. Kimball, Troy, N. Y.

New York, New York. The Levy-Steifel Co. has been incorporated to manufacture knitted goods worsted and yarns. Capital, $51,000. Directors, Bernard Levy, Arnold, Steifel and Samuel Steifel, of New York City.

—Rhode Island, Cranston. The Meshanticut Dyeworks has been organized, to operate the print works formerly connected with the Cranston Worsted Mills. The company will dye raw cotton and yarns. James M. Bourne will be manager.

Rhode Island, Woonsocket. A rumor states that Robert Exley will locate a new worsted yarn mill at this place.

—South Carolina, Columbia. The Columbia Water Power Co. recently purchased the old Saluda Mill, with its water power of about 3,000 h. p. There is talk of erecting a companion mill to the Columbia Mill Company's duck mill.

—South Carolina, Durham. The Durham Hosiery Co. has recently incorporated, capital stock, $70,000. This company is to purchase the Durham Hosiery Mills and the Golden Belt Hosiery Mills, and will probably enlarge the plants. The officers of the company are president, T. M. Martin; vice-president, J. S. Carr; treasurer, George M. Graham. Mr. Graham should be addressed for further particulars.

—Tennessee, Memphis. The Memphis Cotton Mill Co., recently organized, with a capital of $120,000, is to succeed the Bluff City Cotton Mills. President, Lewis Erb, and secretary John Johnson. We understand that arrangements have not yet been completed for starting the mills.

PERSONAL RECORD.

Cotton.

—George Wood recently resigned as overseer of cloth at the Warrick Mill, Rhode Island to take a position in a store.

—B. A. Alexander, recently boss finisher at the W. A. Slater Mill, Slatersville, R. I., is now superintendent of the Boston Duck Co., Bondsville, Mass. His help presented him with a Morris chair and gold pen. The whist club, of which Mrs. Alexander was a member, presented her with a marble clock, and the overseers of other departments presented Mr. Alexander with a masonic charm.

—Joseph Leadbetter has resigned as secondhand of finishing in the Slatersville Mill, and now has charge of finishing for the Falls Co., Norwich.

—J. H. Robertson, formerly of Slatersville and for the past two years with the Falls Co., of Norwich, Ct., has returned to his old position in charge of the finishing room at Slatersville.

—Robert Leatham is now in charge of the finishing department of the Pemberton Mills, Lawrence, having left the Tremont & Suffolk Mills, Lowell.

—James Murphy has resigned his position with the Chicopee Mfg. Co., and has taken a position in charge of the Napping Department of a mill at Galveston, Texas.

—William L. Jenkins, upon his resignation as overseer of the carding room at the Acushnet Mill, New Bedford, was presented, by his fellow overseers and help, with two handsome chairs and a purse.

—W. F. Sherman, who for the past eleven years has been agent and local manager of the Atlantic Cotton Mills, Lawrence, has resigned to engage in his former business of mill engineer and architect. His resignation will take effect the middle of April. He has been very successful with the Atlantic Mills.

—Joseph Bassett has become overseer of weaving at the Boott Mills, Lowell. He was recently overseer at the Social Mfg. Co., Woonsocket.

—Willie H. Jenckes has accepted a position as second hand at the Clinton mill. He was formerly with the Social Mfg. Co. Woonsocket, R. I.

—Charles Tucker is now second hand of weaving at the Natick Mill, Natick, R. I., having succeeded Ely Kershaw, who resigned.

—Dean Sutcliff, recently at the Overland Cotton Mill, Denver, Colo., has taken charge of weaving at the Louise Mills, Charlotte, N. C., J. T. Broadway having resigned.

—J. J. Odum is now with the Aiken Mfg. Co., Bath, S. C., having resigned his position at the Louise Mills, Charlotte, N. C.

—W. J. Jones is now overseer of weaving at the Elmira Mills, Burlington, N. C., having resigned from the Union Cotton Mills, Union, S. C.

—B. L. Still is now with the Spartan Mills, Spartanburg, S. C. He has been with the Greenwood Cotton Mills, Greenwich, S. C., for the past seven years.

—David Grove, formerly of the Valley Queen Mill, River Point, has accepted the position with the Dyerville Mfg. Co., Providence, R. I., which has recently started up.

Charles M. Wilson has resigned from his position in No. 2 mill of the New York Mills to become partner in the firm of Lamphrey & White, manufacturers of Lamphrey protective arch plate, Westfield, Mass. Mr. Wilson was with the New York Mills for 36 years. Since 1885 he has been assistant superintendent.

Frederick Gates is now outside superintendent for the Willimantic Linen Co., Frank S. Shaffer having resigned.

F. A. Cumnock has resigned as superintendent of the Piedmont Mfg. Co., Rockingham, N. C., to accept similar position with the Charlotte Cotton Mills. D. W. Oates has been superintendent of the latter mills, but hereafter will devote much of his time to the First National Bank of Charlotte, of which he has recently been elected cashier.

—Harry R. Watson will be superintendent of the Lincoln Bleach, Print & Dyeworks, at Rockaway, N. J. This is the new plant recently completed and owned by David Lowenthal & Sons, New York City. Mr. Watson was recently with Reid & Barry, Passaic.

—W. H. T. Holt has been appointed assistant superintendent of the W. A. Slater Mills, Jewett City, Ct. He has had charge of the yarn department, and has been succeeded by John Holt, Slatersville, R. I.

—Frank Grover has been appointed superintendent at the Uncasville Mfg. Co. in place of the late Charles Spaulding. A. M. Barlow, of Willimantic, has taken Mr. Grover's place as boss weaver.

Woolen.

—Howard P. Chase has resigned as accountant at the Stone Worsted Mill, Pascoag, to accept a position as assistant superintendent of the Mohegan Mill. He has been succeeded at the Stone Mill by Henry Hardman.

—James Bentley is now boss finisher for the Staffordville Woolen Co., Staffordville, Ct.

—John LeQuinn has been appointed overseer of carding for J. Ring & Son, of Philadelphia, to take Robert Cunningham's place, who recently resigned to enter business on his own account.

—L. F. Bachelder is now clerk and book-keeper at the Elm Woolen Mills, Tilton, N. H.

—James Whalon, recently at Monson, is now boss dyer at the Golden Rod Woolen Mill, Wales, Mass.

—Nicholas Roark, recently boss finisher at the Golden Rod Woolen Mills, Wales, Mass., is now in the Southwood Mills, Philadelphia, Pa. John R. Cowen, Dover, N. H., succeeded Mr. Roark, at Wales.

—Richard Nothwick is now with the Washington Mills, Lawrence, having left the Stevens Mills at Haverhill.

—Fred H. Milles has resigned as boss carder for Alfred Dolge & Son, Dolgeville, N. Y., and has returned to Pittsfield, Mass.

—Howard P. Chase, of Pascoag, R. I., is now assistant superintendent at the Mohegan Mill recently purchased by Jesse Metcalf & Co., of the Wanskuck Mills, Providence.

—Owen Gilleran, recently of Waterford, has succeded James Gilleran, as superintendent of W. H. Prendergast's mill, Bridgeton, R. I.

—James F. Maloney is now inspector at the Oakland Worsted Co., Mapleville, R. I., having resigned from the Mapleville Mill.

—George S. Lowe now has full charge of the spinning at B. Farrell's Woolen Yarn Mill, Philadelphia, Joseph Ogden having resigned.

—Josiah Wood has accepted the position as overseer of carding and combing in the Watervliet Mills, West Troy, N. Y.,

of which Edward Craven is superintendent.

—Boss finisher Gill has resigned from the Algonquin Co., Passaic, N. J., and has gone with the Wilson-Horton Co., Pittsfield, Mass. He has been succeeded at Passaic by James Wall. Mr. Gill was presented with a gold headed cane by his employees, John Coffey making the presentation speech.

—Thomas F. Hall has accepted a position as overseer of weaving for the Riverside Mills Co., Lebanon, N. H. He was formerly with the Broad Woolen Co., Broad Brook, Ct.

—Stephen Smyth, dyer at the Russell Woolen Mill, Pittsfield, Mass., was seriously injured, and sustained a compound fracture of the knee, by being caught in a shafting in the mill, recently.

—Edgar H. Barker is now principal of the woolen and worsted department at the Lowell Textile School. Mr. Barker has recently been with the Pacific Mills, Lawrence. He is a graduate of the Massachusetts Institute of Technology, and has been an instructor in the evening drawing school at Lawrence.

—Arthur Arnold is now with the Warren Woolen Co., Stafford Springs, Conn., as boss weaver. He was recently with the Somersville Mfg. Co.

—George A. Dunham is now with the Hope Valley Woolen Co., a new firm organized to succeed to the property of the late S. A. Owen, Hope Valley, R. I.

—A. B. Marchant is now boss dresser for weaving at the Glen Woolen Mill, Shewville, Conn.

—A. B. Marchant is now boss dresser for the Staffordville Woolen Co., Staffordville, Conn. He was recently at Broad Brook.

—Walter Fuldhouse, late with the Old Kentucky Woolen Mills, Louisville, and previous to that superintendent for a number of years of the mills at Jacksonville, Ill., has been appointed superintendent of the Mississippi Mills, at Wesson, Miss.

—Atack Musgrave is now boss dyer for the Dundee Woolen Co., Passaic, N. J.

—John R. Cowan has left Dover, N. H., having secured a position as finisher in Springfield, Mass.

Knit.

—William Lee, late of Cincinnatti, has accepted a position with the knitting mills of J. C. & I. C. Miller & Co., Baldwinsville, N. Y.

—George J. Manderfield has closed his connection with the South Down Knitting Co., of Allentown, Pa.

—James Foreman has resigned as boss knitter in the Victor Mill, Cohoes, N. Y., and accepted a position in the Riverside Mill, Cohoes.

—W. W. Burke has accepted the position as boss knitter at Cooper's Knitting Mill, Bennington, Vt. He was recently at the Glastonbury Knitting Co., Manchester, Ct.

—Edgard Whicher, who has been foreman of the knitting department for several years at the Winthrop Knitting Co., Lakeport, N. H., has accepted a position as superintendent of the Miner Hosiery Co., Brattleboro, Vt.

—Supt. John McGinnis, with the Athens Knitting Mill, Athens, N. Y., has appointed Martin Surprise foreman of the carding room; Calvin Whitaker boss spinner; Thomas Morgan boss knitter, and John C. Feroe boss finisher. Daniel Decker is the engineer in charge of plant.

Miscellaneous.

—John D. Moore, who has for some time been master mechanic at the Lewiston Bleachery and Dye Works, has taken a position in the engineering department of the Walker Co., Cleveland, Ohio.

Married.

—Steven S. Walsh, boss spinner at the Riverside Woolen Co., Lebanon, N. H., and Miss Lilian Lynch, of Lebanon, were married Feb. 11th.

Deaths.

—Harvey O. Gifford died at his home in East Lee, Mass., recently, at the age of 78 He was superintendent of the Bel Air Mill, Pittsfield, Mass., for many years, but has been a resident of Lee for the past 15 years. He leaves a widow and two sons.

—Henry F. Scatchard, a well known manufacturer in Eastern Pennsylvania, proprietor of the Angora Woolen Mills at Norristown, died at his home March 20th, at the age of 56.

—Amos P. Mann died at his home in Ipswich, Mass., March 20th of pneumonia. He was born in England in 1827. For several years he was overseer of the knitting room at the Ipswich Mills, and for twelve years overseer at Bennington, Vt.

—William Lanagan, recently boss cotton spinner, died at his home, 136 Connarroe St., Manayunk, Pa., on February 7.

—Amos Higgins, who has been 33 years watchman at the Pacific Mills, Lawrence, died Feb. 20th. Age 68.

—Amos Garnsey, Jr. died at his home in Sanford, Me., March 9th. He was master mechanic at the Sanford Mills.

—James E. Hayden died at the home of his daughter, Mrs. Walter S. Preston, Providence, R. I., March 11th. He was well known among manufacturing circles in Connecticut and Rhode Island.

—Christian E. Geisendorff, one of the leading manufacturers of Indianapolis, died at his home in Indianapolis, Ind., Feb. 3d. He was about 84 years of age. He was born in Frederick City, Md. He was married in 1836 to Miss Elizabeth Williams, and soon after located at Dayton, Ohio, where he manufactured ingrain carpets. In 1842 he started the manufacture of woolen goods at Indianapolis, and for some time was connected with the firm of Scudder & Hannaman. The first power looms and spindles used in central Indiana were introduced by Mr. Geisendorff. In 1846 he started in business for himself, and later took as partners his two brothers, George W. and Jacob C. In 1890 Mr. Geisendorff was compelled to retire from business because of ailing health, and he had been confined to his home for the past five years.

Alizarine Black

(PATENTED)

Distinguished from all other blacks by the acid test . . .

It is an acknowledged fact that woolen goods for men's wear of American manufacture, due to the more general use of Alizarine Dyes (including the Alizarine Black), are faster in color and therefore give better service to the public than the foreign goods. This is of special importance in view of the fact that our climate with the clear skies and bright sunshine is more trying to colors than in England, Germany or France

Wm. Pickhardt & Kuttroff

NEW YORK

—George O. Sanderson died March 23d at his home in Waltham, Mass., at the age of 70 years. He was for many years foreman of the hosiery department of the Waltham Bleachery. He served three years in the late war in Company L., First Massachusetts Cavalry, was a member of Post 29 G. A. R. and of Prospect Lodge, I. O. O. F.

—Daniel W. Ashton, a prominent citizen of Pawtucket, R. I. died at his home March 14th. He was born in Manchester, England in 1835, and came to this country at the age of five years. After leaving the public schools in Pawtucket, he learned the trade of pattern making, and for some time was a member of the firm of Luther & Ashton. In 1871, he succeeded his father-in-law, the late James Arnold, who was a manufacturer of cotton machinery. This business he sold in 1877 to George W. Payne & Co. He was also well known as a maker of cloth stretchers and starch and water mangles for printers and bleachers.

George W. Benson, well known in business circles, died at his home in Salem, March 5. He was in the cotton waste business, 36 Purchase St., Boston. He was 62 years of age, and leaves a widow, four sons and a daughter.

J. De Trafford, Blackstone, treasurer of the Totoket Mills, and secretary of the Attawaukgen Co., died in New York city, March 7. He was about 50 years of age, and leaves a widow and one son.

—George Sanborn, for many years outdoor superintendent of the Essex Dyeworks, died at his home, 77 Bradford St., Lawrence, on March 8, at the age of 75. He had been connected with the Essex Company 52 years. He was prominent in Lawrence affairs. He leaves a widow, one son, Lieut. George A. Sanborn, and a daughter, Mrs. W. A. McCrillis.

—Thomas B. Wattles, agent of the Boscawen Mills, at Penacook, N. H., died March 6. He was born in Norwich, Ct., March 7, 1835. At the age of twenty, he was appointed agent of the Pembroke Mills, and he next held the position of agent of the Hooksett Mills. From there he went to the Neponset Mills, in Canton, Mass. In 1872, he became agent of the Chicopee Mfg. Co., Chicopee, Mass. From there he took charge of the Boscawen Mills.

—James Waring, ex. treasurer of the Narragansett Mills, died at his home in that city, March 3, at the age of 73. Mr. Waring was born in England. He was in the dry goods business until 1871, when he organized the Narragansett Mills, and was chosen agent and treasurer, from which position he resigned last spring, on account of ill health.

C. G. Wood, one of the best known woolen manufacturers in central Massachusetts, died March 4, in Worcester. At different times he operated mills in Uxbridge, Mohegan, R. I., and Holden. The latter was known as the Quinapoxet Mills, and was under his management at the time of his death.

—William Mercer, head book-keeper of the Bridgeton Woolen Co., Bridgeton, N. J., died early in February at the age of 60.

BUYERS' INDEX

Advertisers whose names do not appear under desired headings will please notify the publishers. Such omissions are accidental, not intentional.

Alphabetical Index to Advertisements follows this Classified List.

Architects and Mill Engineers.
Berlin Iron Bridge Co, The, East Berlin, Ct.
Ferguson, John W, Paterson, N. J.

Automatic Boiler Feeds.
D'Este & Seeley Co, 29 Haverhill St, Boston,

Automatic Feeds for Cotton and Wool.
Harwood, Geo. S, & Son, 53 State St, Boston.
Woonsocket Machine & Press Co, Woonsocket, R. I.

Bailing Machine.
Torrance Mfg. Co, 18 Davis St, E. Newark, N. J.

Bandings.
See under Yarns.

Belting.
Alexander Bros., 410 No. 3d St., Phila., Pa.
Boston Belting Co., 256 Devonshire St., Boston, Mass.
Fell, Geo. & Son, Bolton, England.
Link Belt Machinery Co., Chicago, Ill.
Ulmer Leather Co, Norwich, Conn.
See also Mill Supplies.

Belt Dressing.
Alexander Bros, 410 No. 3d St, Phila, Pa.

Bindings.
See Tapes and Braids.

Bleaching Materials.
Roessler & Hasslacher Chemical Co, 100 William St, New York.

Boiler Compounds.
Imperial Chemical Co, 324 St. John St, Phila, Pa.

Boxes, Cloth Boards, Etc.
Pearson, J. T, Kensington, Pa.

Braids.
See Tapes, Braids and Edgings.

Burr Pickers.
Curtis & Marble Machine Co., Worcester, Mass.
Sargent's, C. G., Sons, Graniteville, Mass.

Card Clothing.
Ashworth, Elijah, Fall Biver, Mass.
Leigh, Evan A, 35 Mason Building, Boston.

Calico Printers' Machinery and Supplies.
Butterworth, H. W., Sons & Co., Philadelphia.
New Bedford Copper Co, New Bedford, Mass.
Phillips Co, The Thomas, Providence, R. I.
See also Dyeing, Bleaching Machinery, etc.

Carders' Tools.
Brown, W. H, Mechanic St, Worcester, Mass.

Carpet Machinery.
Altemus, W. W, & Son, 2816 N. 4th St, Phila, Pa.
Crompton & Knowles Loom Works, Worcester, Mass.
Curtis & Marble Machine Co, Worcester, Ms.
Furbush, M. A, & Son, Machine Co, Phila, Pa.
Howard, Geo. C., 1783 Barker St., Phila., Pa.

Chemicals and Apparatus.
Bullock & Crenshaw, 528 Arch St, Phila, Pa.
Roessler & Hasslacher Chemical Co, 100 William St, New York.

Chemist.
Adriance, John S., 105 East 39th St., New York.

Cloth Testing Machine.
McKnight, S, 771 Broadway, New York.

Combs (Wool and Cotton).
Crabb, William, & Co, Newark, N. J.
Townsend, Thomas, 157 Orange St., Providence, R. I.

Comber Needles.
Townsend, Thos., Providence, R. I.

Commission Merchants.
Hayes, O. H, & Co, New York.

Copper Print Rollers.
New Bedford Copper Co, New Bedford, Mass.
Phillips Co, The Thomas, Providence, R. I.
Revere Copper Co, 174 Oliver St, Boston.

Copper Work for Dyers.
Phillips Co, The Thomas, Providence, R. I.

Cotton (Egyptian).
Stoddard, Haserick, Richards & Co., Boston.

Cotton Machinery.
Altemus, W. W, & Son, 2816 N. 4th St, Phila. Pa.
Ashworth, Elijah, Fall River, Mass.
Crompton & Knowles Loom Works, Worcester, Mass.
Curtis & Marble Machine Co, Worcester, Mass.
Draper Company, Hopedale, Mass.
Fairmount Machine Co, 22d and Wood Sts, Philadelphia.
Howard & Bullough American Machine Co, Pawtucket, R. I.
Kilburn, Lincoln & Co, Fall River, Mass.
Leigh, Evan A, 35 Mason Building, Boston.
Lowell Machine Shop, Lowell, Mass.
Mason Machine Works, Taunton, Mass.
Payne, Geo. W, & Co, Pawtucket, R. I.
Phillips Co, The Thomas, Providence, R. I.
Stoddard, Haserick, Richards & Co, Boston, Mass.
Townsend, Thomas, 157 Orange St., Providence, R. I.
Whitin Machine Wks, Whitinsville, Mass.
Woonsocket Machine & Press Co, Woonsocket, R. I.

Cotton Openers and Lappers.
Howard & Bullough American Machine Co, Pawtucket, R. I.

Cutters for Knit Fabrics.
Kennedy, Thos. (Cutters, etc.,) Cohoes, N. Y.

Damper Regulators.
D'Este & Seeley Co. (Curtis), 29 Haverhil St, Boston, Mass.

Designers.
Fresnel, Gustave, 125 W. 56th St, N. Y.

Dryers.
Philadelphia Textile Machinery Co, Philadelphia, Pa.
Phillips Co, The Thomas, Providence, R. I.
Sargent's, C. G., Sons, Graniteville, Mass.
Sturtevant, B. F. Co, 34 Oliver St, Boston, Mass.

Dusters.
See Wool and Waste Dusters.

Dyeing, Bleaching and Finishing.
Greenwood, R, & Bault, Frankford, Pa.
Home Bleach & Dye Works, Pawtucket and Valley Falls, R. I.
Kensington Dye Works, Kensington, Pa.
Littlewood, G. J., & Sons, Manayunk, Pa.
Warren, W, Thread Works, Westfield, Mass.
Webster Dye Works, Webster, Mass.

Dyeing, Drying, Bleaching and Finishing Machinery.
Butterworth, H. W, & Sons Co, Phila, Pa.

Curtis & Marble Machine Co, Worcester, Mass.
Fairmount Machine Co, 22 and Wood Sts, Philadelphia.
Granger Foundry & Machine Co, Providence, R. I.
Hopkins, A, & Co, Bridgeton, R. I.
Howard, Geo. C., 1783 Barker St., Phila., Pa.
Lincoln & Co, 54 Arch St, Hartford, Ct.
Parks & Woolson Machine Co, Springfield, Vt.
Phenix Iron Foundry, Providence, R. I.
Phillips, The Thomas Co, 91-95 South Main St, Providence, R. I.
Sturtevant, B. F. Co, 34 Oliver St, Boston, Mass. (Drying.)
Woonsocket Machine & Press Co, Woonsocket, R. I.
Woonsocket Napping Machine Co, Woonsocket, R. I.

Dye Sticks.

Haedrich, E. M, 311 1-2 Walnut St, Phila, Pa.

Dyestuffs and Chemicals.

Amend Process Co., 205-211 Third Ave., New York.
Anchor Color Mfg. Co, 464 Cherry St, New York.
Atteaux, F. E, & Co, 174 Purchase St, Boston, Mass.
Bird, F. J , 122 Arch street, Philadelphia.
Bischoff, & Co, 87 Park Place, N. Y.
Bosson & Lane, 36 Central Wharf, Boston.
Cochrane Chemical Co., 50 Kilby St., Boston.
Corey, S. J, 273 Congress St, Boston.
Dillon & Co, 20 Cedar St., New York.
Farbenfabriken of Elberfeld Co, 77 William St, N. Y.
Geisenheimer & Co, 189 Front St, New York.
Hanna-Schoellkopf Co. Philadelphia, Pa.
Holliday, Read, & Sons, 100 William St., New York.
Innis & Co, 3 Cedar St, New York.
Jaeck Bros., The, Co., 62-68 No. 11th St, Brooklyn, N. Y.
Janney, O. S, & Co, Phila. and Boston.
Johnson, Chas. A, & Co, 22 Dey St, N. Y.
Johnson, Wm. G, & Co, Uncasville, Conn.
Keller, John J, & Co, 104 106 Murray St, N. Y.
Klipstein, A, & Co, 122 Pearl St, N. Y.
Koechl, Victor, & Co, 79 Murray St., N. Y.
Matheson, W. J, & Co, 178 Front St, N. Y.
Merrimac Chemical Co, Boston, Mass.
N. Y. & Boston Dyewood Co, 55 Beekman St, New York.
Oakes Mfg. Co, 93 Pearl St, N. Y.
Phillips (Moro) Chemical Co, 131 S. 3d St, Phila., Pa.
Pickhardt & Kuttroff, New York.
Roessler & Hasslacher Chemical Co, 100 William St , New York.
Sharpless Dye Wood Ext. Co , 22 N. Front St, Phila, Pa.
Stamford Mfg. Co, 133-137 Front St., N. Y.
Stone & Ware Co, The, 157 Maiden Lane. N. Y.
Sykes & Street, 85 Water St, N. Y.
Thomas, N. Spencer, Elmira, New York.
Webster Dye Works, Webster, Mass.

Dyers and Finishers.

Boston Finishing Works, Williamstown Mass.
Brophy's Sons, T, Jasper St., above Clearfield St., Philadelphia.
Cranston Worsted Mills (yarns), Bristol R. I.
Firth & Foster Co, Kensington, Pa.
Greenwood, R. & Bault, Frankford, Pa.
Home Bleach & Dye Works, Pawtucket, R. I.
Industrial Dyeing & Finishing Works, 3529-45 Frankford Ave, Philadelphia.
Oakdale Dye Works, 913 W. York St, Phila, Pa.
Pawtucket Dyeing & Bleaching Co, Pawtucket, R. I.
Warren, W. Thread Works, Westfield, Mass.
Webster Dye Works, Webster, Mass.

Dyers' Clogs.

Wildman, Jos, & Co, 1908 N. Front St, Phila.

Edgings.

See Tapes, Braids and Edgings.

Electrotyping and Printing.

Whitcomb, H. C, & Co, Boston.

Elevators.

Cohoes Foundry & Machine Co, Cohoes, N.Y.
Howard, Geo C., 1783 Barker St., Phila., Pa.
Salem Foundry & Machine Shop, Salem, Mass.
St., New York.

Engineers, Mechanical.

Berlin Iron Bridge Co, E. Berlin, Ct.
Ferguson, John W, Paterson, N. J.

Express Money Orders and Travelers' Cheques.

American Express Co offices in every city

Fans—Exhaust and Ventilating.

See Ventilating Apparatus.

Feed Water Pumps.

Goulds Mfg. Co, Seneca Falls, N. Y.
Phœnix Iron Foundry, Providence, R. I.

Finishing Machinery.

See Dyeing, Drying, Bleaching and Finishing.

Fluted Rolls.

Cohoes Foundry & Machine Co, Cohoes, N.Y
Thurston, A. G, & Son, Box 528, Fall River. Mass.

Fulling Mills for Woolen Goods.

Hopkins, A, & Co. Bridgeton, R. I.
Hunt, Rodney, Machine Co, Orange, Mass.
Hunter Jas, Machine Co, No. Adams, Mass.

Gas Engines.

Jones, Lewis, 60½ and Media Sts, Phila, Pa.

Gas Singeing Machines.

Butterworth, H. W. Sons Co., Philadelphia.
Curtis & Marble Machine Co, Worcester, Ms.

Gear Cutting Machine.

Blaisdell, P, & Co, Worcester, Mass.
Whiton, The D. E, Co, New London, Conn.

Harness Varnish.

D. L. Witmer & Bro, 5th St. and Germantown Ave, Philadelphia.

Heating.

See Ventilating.

Heddles.

Watson, L. S, Mfg. Co, Leicester, Mass.

Hosiery Boards.

Pearson, J. T, Kensington, Pa.

Hose and Rubber Goods.

Boston Belting Co., 256 Devonshire St., Boston.

Index.

Burr Index Co, 236 Asylum St, Hartford, Conn.

Ink, Stamping.

Witmer, D. L, & Bro, 5th St. and Germantown Ave, Philadelphia.

Insurance (Employers' Liability).

Employers' Liability Assurance Co, 28 Central St, Boston, Mass.

Knit Goods Edgings, Trimmings, etc.

Byram, F. A, Germantown, Pa.
Cheney Bros, Silk Goods, 479 Broome St, N. Y.
Fleming & Chapin, 229-231 Church St, Phila, Pa.
Friedberger & Co, Edgings, Germantown Phila, Pa.
Hepner & Horwitz, Lacings, 30 Howard St, N. Y.
Krout & Fite Mfg. Co, 2632 Mascher St, Phila.
Weimar Bros, 1817 East York St, Phila. Pa.

Knit Goods Finishing Machines, Crochet, Etc.

Excelsior Sewing Machine Co, 120 N. 7th St, Phila, Pa.
Merrow Machine Co, The, Hartford, Conn.
Nye & Tredick, 606 Arch St, Phila, Pa.
Scott & Williams, 2097 E. Cumberland St, Phila, Pa.

Knit Goods Brushers.

Ardrey, S. B, & Sons, Bristol, Pa

Jones, Lewis, Philadelphia, Pa.
Musgrove, C. M., Plainville, Conn.

Knitting Machine Cylinders.

Paxton & O'Neill, 129 Bread St, Phila, Pa.
Stafford & Holt, Little Falls, N. Y.

Knitting Machinery.

Boss Knitting Machine Works, 7th and Walnut Sts., Reading, Pa.
Branson Machine Co., 506 John St., Philadelphia.
Brinton, H, & Co, 213 Race St, Phila, Pa.
Campbell & Clute, Cohoes, N. Y.
Cooper, Chas, Bennington, Vt.
Crane Mfg. Co, Lakeport, N. H.
Eckersley, Richard, N. E. cor. American and York Sts, Philadelphia, Pa.
Excelsior Knitting Machine Manufacturing Co, Allentown, Pa.
Hepworth & Co, Lehigh Ave. and Mascher St, Phila, Pa.
Jenckes, E. Mfg. Co, Pawtucket, R. I.
Jones, Lewis, 60 1-2 and Media Sts, Philadelphia, Pa.
Kennedy, Thos. (Cutters, etc.), Cohoes, N. Y.
Keystone Knitting Machine Mfg. Co, 40 No. 7th st, Philadelphia, Pa.
Leighton Machine Co, Manchester, N. H.
Little Hustler Napper Co., Hudson, N. Y.
Mayo Knitting Machine & Needle Co, Franklin, N. H.
McMichael & Wildman Mfg. Co, Norristown, Pa.
Mueller, A, 760 Lexington Ave, Brooklyn, N. Y.
Nye & Tredick, 606 Arch St, Phila, Pa.
Paxton & O'Neill, 127 Bread St, Phila, Pa.
Payne, G. W. & Co, Pawtucket, R. I. (Winders.)
Pepper Mfg. Co, Lakeport, N. H.
Scott & Williams, 2097 E. Cumberland St., Phila., Pa.
Stafford & Holt, Little Falls, N. Y.
Standard Machine Co., 508 Minor St., Philadelphia, Pa.
Taylor, James, 835 Arch St, Phila, Pa.

Knitting Needles and Supplies.

Breedon, Wm, & Son, Amsterdam, N. Y.
Cooper, Chas, Bennington, Vt.
Corey, Wm, Co, Manchester, N. H.
Crane Mfg. Co, Lakeport, N. H.
Dodge Needle Co., Manchester, N. H.
Ives, Loyal T, New Brunswick, N. J.
Keystone Knitting Machine Mfg. Co, 40 No. 7th St, Philadelphia, Pa.
Lydall, H, & Fouids, Manchester, Conn.
Manufacturers' Supplies Co., 66 No. 4th St., Philadelphia.
Mayo Knitting Machine & Needle Co, Franklin, N. H.
Musgrove, C. M., Plainville, Conn.
Page Needle Co, Chicopee Falls, Mass.
Treat, Orion, Manchester Green, Conn.
Wardwell Needle Co, Lakeport, N. H.

Laboratory Outfits.

Bullock & Crenshaw, 528 Arch St Phila, Pa.

Lamps, Electric.

Beacon Lamp Co, New Brunswick, N. J.
Lynn Incandescent Lamp Co., Lynn, Mass.

Looms.

Crompton & Knowles Loom Works, Worcester, Mass.
Draper Company, Hopedale, Mass.
Fairmount Machine Works, 22d and Wood Sts. Philadelphia.
Furbush, M. A, & Son Co, Phila, Pa.
Howard, Geo. C., 1783 Barker St, Phila Pa. (For wire.)
Kilburn, Lincoln & Co, Fall River, Mass.
Lowell Machine Shop, Lowell, Mass.
Mason Machine Works, Taunton, Mass.
Whitin Machine Works, Whitinsville, Ms,
Woonsocket Machine & Press Co, Woonsocket, R. I.

Loom Picker Manufacturers.

Crompton & Knowles Loom Works, Worcester, Mass.
Loom Picker Co, Biddeford, Me.

Lubricators.

Dixon, Jos, Crucible Co, Jersey City, N. J.

Lumber.

Stearns, A. T, Lumber Co, Neponset, Mass.

Lumpers.

Gerry, George, & Son, Athol, Mass.

Machinery Dealers.

Jefferson, Ed, & Bro, 28 Strawberry St, Phila, Pa.
Schofield, Geo. L, 123 N. Front St, Phila,
Scott, James, 222 Chestnut St, Phila, Pa.

Machinery Wipers.

American Silk Mfg. Co, 311 Walnut St Philadelphia, Pa.

Machinists' Tools.

Blaisdell, P, & Co, Worcester, Mass.
Whiton, The D. E. Co, New London, Conn.

Mails.

Walder, J, Paterson, N. J.

Measuring and Folding Machines.

Curtis & Marble Machine Co, Worcester, Ms.
Elliott & Hall, 544 Hermon St, Worcester, Mass.

Mill Builders and Engineers.

Berlin Iron Bridge Co, The, East Berlin, Ct.
Ferguson, John W, Paterson, N. J.

Mill Supplies.

American Supply Co, Providence, R. I.
Bamford & Smith, Pascoag, R. I.
Bristol, The, Co., Waterbury, Conn
Buckley's, Benj. Son, Gun Mill, Paterson, N. J.
Harwood, Geo. S, & Son, 53 State St, Boston.
Hill, Jas, Mfg. Co, Providence, R. I.
Jefferson, Ed, & Bro, 28 Strawberry St, Phila, Pa.
Spofford, Wm. S, & Son, 5-11 Culver St, Providence, R. I.
Stevenson Bros. & Co, 132 So. 2d St, Philadelphia, Pa.
Thurston, A. G, & Son, Fall River, Mass.
Watson, L. S, Mfg. Co, Leicester, Mass.

Napping Machines.

American Napping Machine Co, Williamstown, Mass
Ardrey, S. B, & Sons, Bristol, Pa.
Curtis & Marble Machine Co, Worcester, Mass.
Jones, Lewis, 60 1-2 and Media Sts., Philadelphia, Pa.
Little Hustler Napping Co, Hudson, N. Y.
Parks & Woolson Machine Co, Springfield Vt.
Woonsocket Napping Machine Co, Woonsocket, R. I.

Oilless Bearings.

N. American Metalline Co, 62 W. Ave. and 3rd St, Long Island City, N. Y.

Oil Filters.

Burt Mfg. Co, Akron, Ohio.
Robertson, Jas. L, & Sons, 204 Fulton St, New York.

Paints.

American Fire Resisting Paint Co, 17 Broadway, New York.
Devoe & Reynolds, Fulton and Williams St, New York.

Pantagraphs for Mill Engraving.

Johnson, C. A, & Co, 22 Dey St, New York.

Patent Solicitors.

Crosby & Gregory, 34 School St, Boston, Mass.
Massink, H., Amsterdam, Holland.
Wright, Brown & Quinby, 53 State St, Boston, Mass.

Penstocks.

Dalrymple, George, Fair Haven, Vt.

Peroxide of Sodium.

Roessler & Hasslacher Chemical Co., 100 William St, New York.

Picker Sticks.

Loom Picker Co., Biddeford, Me.
Smith, Lee, & Co., Knoxville, Tenn.

Picking, Carbonizing and Garnetting.

Garfield Woolen Co. Garfield, N. J.
Kennebec Woolen Mills 2025 Naudain St., Philadelphia.

Pipe Covering (Magnesia).
Keasby, R. A, 54 Warren St, New York.
Keasby & Mattison Co. Ambler, Pa.
Nightingale, S. C, & Childs, Atlantic Ave, Boston, Mass.

Pneumatic Conveying.
See Ventilating.

Power Transmitting Machinery.
Fairmount Machine Works, 22d and Wood Sts, Philadelphia.
Howard, Geo. C., 1783 Barker St., Phila., Pa.
Hunter, Jas, Machine Co, No. Adams, Mass.
Kilburn, Lincoln & Co, Fall River, Mass.
Link Belt Machinery Co, Chicago, Ill.

Presses.
Crawford, J. J, & Son, Nashua, N. H. (Power Screw, Hydraulic, Hollow Steam Plate.)
Curtis & Marble Machine Co, Worcester, Ms.
Howard, Geo. C., 1783 Barker St., Phila., Pa.
Phillips Co, The Thomas, Providence, R. I.
Pownall, F. H, Iron Works, Jamesburg, N. J.
Sullivan Machinery Co., Claremont, N. H.
Woonsocket Machine & Press Co, Woonsocket, R. I.

Pressure Regulators for Steam and Water.
D'Este & Seeley Co. (Curtis) 29 Haverhill St, Boston, Mass.

Printers and Embossers.
Novelty Textile Printing Co, 447-449 W. 14th St, New York.

Pumps.
Goulds Mfg. Co, Seneca Falls, N. Y.

Reed and Harness Manufacturers.
American Supply Co, Providence, R. I.
Loom Picker Co, Biddeford, Me.
Walder, J, Paterson, N. J.

Ribbons.
Cheney Bros, S. Manchester, Ct.

Roller Skins.
Fell, Geo, & Son, Bolton, England.

Roofing, Gravel, Slag and Composition.
Armitage Mfg. Co, Richmond, Va.
Warren Chemical & Mfg. Co, 45 Fulton St, New York.

Roofing, Paint and Paper.
Armitage Mfg. Co, Richmond, Va.

Roving Cans and Sheet Metal Work for Mills.
Hill, Jas, Mfg. Co, Providence, R. I.
N. E. Ventilating & Heating Co, 930 Manton Ave, Providence, R. I.
Sullivan Machinery Co, Claremont, N. H.

Saddles, Stirrups and Levers.
Dixon Lubricating Saddle Co, Bristol, R. I.

Sample Cutters.
Gleason, A. H, Rockbottom, Mass.

Schools.
Gavey Correspondence School of Textile Design. P. O. Box 222, Brooklyn, N. Y.
Lowell Textile School, Lowell, Mass.
Philadelphia Textile School, Phila, Pa.

Sewing Machines and Supplies.
Curtis & Marble Machine Co, Worcester, Mass.
Dinsmore Mfg. Co, Salem, Mass.
Frame, Gibbons, 2nd and Diamond Sts, Phila, Pa.
Manufacturers' Supplies Co., 66 No. 4th St., Philadelphia.
Nye & Tredick, 606 Arch St, Phila, Pa.
Scott & Williams, 6th and Arch Sts, Phila, Pa.

Shearing Machinery.
See Dyeing, Drying, Bleaching and Finishing.

Shell Rolls.
Cohoes Foundry & Mach. Co, Cohoes, N. Y.
Thurston, A. G, & Son, Box 528, Fall River, Mass.

Shoddies.
See Wool Shoddies.

Shuttles.
See Bobbins, Spools, Shuttles, Etc.

Silk Machinery.
Butterworth, H. W. Sons Co, Philadelphia.
Crompton & Knowles Loom Works, Worcester, Mass.

Singe Plates.
Butterworth, H. W. Sons Co., Philadelphia.
New Bedford Copper Co, New Bedford, Ms.

Sizing, Starch and Gums.
American Glutrose Works, Penn Mutual Bldg. Phila, Pa.
Stein, Hirsch & Co, 165 Duane St, New York.

Slashers.
Cohoes Foundry & Machine Co, Cohoes, N. Y.
Lowell Machine Shop, Lowell, Mass.
Phillips Co, The Thomas, Providence, R. I.

Soaps.
American Soap & Washolene Co, Cohoes, N. Y.
Holbrook Mfg. Co., 466 Washington St., N. Y.
India Alkali Works, Boston.

Spindles.
Buckley, Benj's, Sons, Gun Mill, Paterson, N. J.
Draper Company, Hopedale, Mass.
Ward & Vandegrift, Elmer, N. J.
Whitin Machine Wks, Whitinsville, Mass.

Spindle Tubes.
Bamford & Smith, Pascoag, R. I.

Spinning Cylinders.
Hill, Jas, Mfg. Co, Providence, R. I.
N. E. Ventilating & Heating Co, 930 Manton Ave, Providence, R. I.

Spinning Frames.
See Cotton Machinery.

Spinning Rings.
Draper Company, Hopedale, Mass.
Whitinsville Spinning Ring Co, Whitinsville, Mass.

Spinners' Supplies.
Dixon Lubricating Saddle Co, Bristol, R. I.

Spinning Tubes.
Buckley, Benj's. Son, Gun Mill, Paterson, N. J.

Steam Boilers.
Brown, C. H, & Co, Fitchburg, Mass.

Steam Boiler Insurance.
Hartford Steam Boiler Inspection & Insurance Co, Hartford, Conn.
Mutual Boiler Insurance Co, 31 Milk St, Boston.

Steam Damper Regulators.
D'Este & Seeley Co, 29 Haverill St, Boston Mass.

Steam Engines.
Brown, C. H, & Co, Fitchburg, Mass.
Hooven (The), Owens & Reutschler Co, Hamilton, O.

Steam Separators.
D'Este & Seeley Co. (Curtis), 29 Haverill St., Boston.
Robertson, Jas. L, & Sons, 204 Fulton St, New York.

Steam Specialties.
Butterworth. H. W. Sons Co., Philadelphia.
D'Este & Seeley Co, 29 Haverhill St, Boston
Haines. W. S. C 136 South 4th St, Phila, Pa.
Robertson, Jas L. & Sons, 204 Fulton St, New York.

Steam Traps.
D'Este & Seeley Co. (Curtis) 29 Haverhill St, Boston, Mass. (return float and expansion).
Haines, W. S. C 136 South 4th St, Phila, Pa.

Tanks, Tubs and Vats.
Caldwell Co., W. E. 202 Brook St., Louisville, Ky.
Challenge Wind Mill & Feed Mill Co, 195 High St, Boston, Mass.
Corcoran, A. J, 11 John St, New York.
Cypress Lumber Co, Apalachicola, Fla.
Stearns, A. T, Lumber Co, Neponset, Mass.
Woolford, George, 2240 No. 9th St, Phila, Pa

Tapes, Braids and Edgings.
Fleming & Chapin, 229-231 Church St, Phila, Pa.
Friedberger & Co, Germantown, Pa.
Goff, D. & Sons, Powtucket, R. I.
Krout & Fite Mfg. Co., 2632 40 Mascher St., Philadelphia.
Perseverance Mills, 2632-40 Mascher St. Phila, Pa.
Weimar Bros, 1817 East York St, Phila, Pa.
Young, Wm. M, 3638-40 Frankford Ave, Philadelphia, Pa.

Teasels.
Kellogg, Wm, W, Skaneateles, N. Y.

Temperature Regulators.
D'Este & Seeley Co, 29 Haverhill St, Boston.
Haines, W. S. C, 136 South 4th St, Phila, Pa.

Tentering Machines.
See Dyeing, Bleaching Machinery, Etc.

Tension Pulleys.
N. E. Ventilating & Heating Co, 930 Manton Ave, Providence, R. I.

Testing Machines.
Howard, Geo. C., 1783 Barker St., Phila., Pa

Towers.
Caldwell Co., W. E. 202 Brook St., Louisville, Ky.
Challenge Wind Mill & Feed Mill Co, Boston, Mass.

Traveler's Cheques.
American Express Company.

Turbines.
(See Water Wheels.)

Valves.
D'Este & Seeley Co, 29 Haverhill St, Boston Mass.

Ventilating Apparatus.
Berry, A. Hun, 23 W. 1st St, Boston, Mass.
Massachusetts Fan Company, Room 641, 53 State St, Boston.
New England Ventilating & Heating Co, Providence, R. I.
Philadelphia Textile Machinery Co, Hancock St, above Lehigh Ave, Phila, Pa.
Sargent's, C. G., Sons, Graniteville, Mass.
Sturtevant, B. F. Co, 34 Oliver St, Boston, Mass.

Washers (Cloth).
Hopkins, A, & Co. Bridgeton, R. I.
Hunt, Rodney, Machine Co, Orange, Mass.
Hunter, Jas, Machine Co, No. Adams, Mass.
Phillips Co, The Thomas, Providence, R. I.

Watches.
Elgin, National Watch Co., Elgin, Ill.

Watchman's Clock.
Eco Magneto Clock Co, 620 Atlantic Ave, Boston.
Nanz & Co, 116A Chambers St, New York.

Water Pressure Regulators.
D'Este & Seeley Co, 29 Haverhill St, Boston.

Water Wheels.
Bradway, C. P, West Stafford, Conn.
Camden Water Wheel Works, Camden, N.Y.
Christiana Machine Co, Christiana, Pa.
Humphrey Machine Co., Keene, N. H.
Hunt, Rodney, Machine Co, Orange, Mass.
Leffel, James, & Co, Springfield, O.

Water Wheel Governors.
Bradway, C. P, West Stafford, Ct.
Cohoes Foundry & Machine Co, Cohoes N. Y.
Leffel, James & Co, Springfield, Ohio.
Lombard Water Wheel Governor Co, 61 Hampshire St, Boston.

Winders. (Hosiery.)
Payne, G. W. & Co, Pawtucket, R. I.
Universal Winding Co, 226 Devonshire St, Boston.

Wood Pulleys.
Saginaw Manufacturing Co, Saginaw, Mich.

Wool.
Lyon, John H, & Co, 12 Reade St, N. Y.

Wool Cleaning Compound.
India Alkali Works, Boston.

Wool Combing Machinery.
Crabb, Wm, & Co, Newark, N. J.
Crompton & Knowles Loom Works, Worcester, Mass.
Townsend, Thomas, 157 Orange St, Providence, R. I.

Wool Extracts.
Garfield Woolen Co, Garfield, N. J.

Wool and Waste Dusters.
Gerry, Geo, & Son, Athol, Mass.
Sargents', C. G., Sons, Graniteville, Mass.
Stillman-Randall Machine Co, Westerly, R. I.

Woolen and Worsted Machinery.
Altemus, W. W, & Co, 2816 N. 4th St, Phila Pa.
Butterworth, H. W. Sons Co., Philadelphia.
Crompton & Knowles Loom Works, Worcester, Mass.
Curtis & Marble Machine Co, Worcester, Mass.
Fairmount Machine Works, 22d and Wood Sts, Philadelphia.
Furbush, M. A. & Son Machine Co, Phila, Pa.
Harwood, Geo. S, & Son. 53 State St, Boston.
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Parks & Woolsen Machine Co., Springfield, Vt.
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Philadelphia Textile Machinery Co., Hancock and Somerset Sts., Philadelphia.
Phillips Co. The Thomas, Providence, R. I.
Sargent's, C. G., Sons, Graniteville, Mass.
Stoddard, Haserick, Richards & Co, Boston, Mass.
Woonsocket Machine & Press Co Woonsocket, R. I.
Woonsocket Napping Machine Co., Woonsocket, R. I.

Wool, Hair and Noils.
Becker, Chas. W, Agt, Amsterdam, N. Y.
Fowles & Co, 106 Church St, Phila.

Wool Shoddies.
Becker, Chas. W, Agt, Amsterdam, N. Y.
Garfield Woolen Co, Garfield, N. J.
Kennebec Woolen Mills, 2025 Naudain St, Philadelphia.
Riverdale Woolen Co, Riverdale, Northbridge, Mass.

Wool Sorters and Scourers.
Kennebec Woolen Mills, 2025 Naudain St, Philadelphia.

Wool Washing, Preparing and Drying Machinery.
Phillips Co, The Thomas, Providence, R. I.
Sargent's, C. G, Sons, Graniteville, Mass.

Yarns, Threads, Etc.

Banding.

Moore, C. & Co. 12 S. 5th St, Phila, Pa.
Warren, W, Thread Works, Westfield, Mass.
Sawyer, Stone & Co, 86 and 88 Franklin St, N. Y.
Solis, Andrew J, Jr, & Co, 179 Devonshire St, Boston, Mass.
Tucker & Cook Mfg. Co, Conway, Mass.
White, James F, & Co, N. Y. and Phila, Pa.
Whittier Cotton Mills, Lowell, Mass.

Carpet Yarns.

Fleming & Chapin, 229-231 Church St, Phila, Pa.

Cotton Yarns.

American Spinners' Cotton Yarn Exchange, 226 Devonshire St, Boston.
Burnet & Co., 24 George Sq., Glasgow, Scotland.
Catlin & Co, New York and Boston.

Clark, Wm, Co, Westerly, R. I.
Cohannet Mills, Taunton, Mass.
Dana Warp Mill, Westbrook, Me.
Eddy & Street, Providence, R. I.
Eichmann & Sternberg, 530 Broadway, cor. Spring St., N. Y.
Fleming & Chapin, 229-231 Church St, Phila, Pa.
Germantown Spinning Co, Germantown, Pa.
Grant Yarn Co, Fitchburg, Mass.
Greene & Daniels Mfg. Co, Pawtucket, R. I.
Hadley Co, Holyoke, Mass.
Hawes, O. S, & Bro, Fall River, Mass.
Holland & Webb, 487 Broadway, N. Y.
Indian Orchard Co., Indian Orchard, Mass.
Jenckes, E., Mig. Co., Pawtucket, R. I.
Kerr Thread Co, Fall River, Mass.
King, Alex, & Co, 54 Leonard St, New York City.
Mitchell, Jas. E, & Co, Boston and Phila, Pa.
Montgomery, J. R, Co, Windsor Locks, Ct.
Monument Mills, Hou-atonic, Mass.
New England Thread Co, Pawtucket, R. I.
Orswell Mills, Fitchburg, Mass.
Sanford Spinning Co, Fall River, Mass.
Sawyer, Manning & Co, 86 and 88 Franklin St, N. Y.
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White, James F, & Co, 54 56 Worth St, N. Y.
Whittier Cotton Mills, Lowell, Mass.

Gassed Yarns.

Greene & Daniels ·ig. Co, Pawtucket, R. I.
King, Alex, & Co, 54 Leonard St, New York.

Glazed Yarns.

Blodgett & Orswell, Pawtucket, R. I.
Eichmann & Sternberg, 530 Broadway, cor. Spring St., N. Y.
Fleming & Chapin, 229-231 Church St, Phila, Pa.
Indian Orchard Co., Indian Orchard, Mass.
Kerr Thread Co, Fall River, Mass, and 29 Mercer St, N. Y.
King, Alex, & Co, 54 Leonard St, New York.
Malcolm Mills Co, Frankford, Pa.
Montgomery & Co, J. R, Windsor Locks, Ct.
Warren, W, Thread Works, Westfield, Mass.
Whittier Cotton Mills, Lowell, Mass.

Harness Twines.

Fawcett, Hughes, 115 Franklin St., N. Y.
Hadley Co, 95 Milk St, Boston, Mass.
Kerr Thread Co, Fall River, Mass, and 29 Mercer St, N. Y.
King, Alex, & Co, 54 Leonard St, New York.
Moore, C , & Co., (S. W. cor. 5th and Market Sts.)
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Whittier Cotton Mills, Lowell, Mass.

Hosiery and Knitting Yarns.

American Spinners' Cotton Yarn Exchange, 226 Devonshire St. Boston, Mass.
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Cohannet Mills, Taunton, Mass.
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Fleming & Chapin, 229-231 Church St, Phila, Pa.
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Greene & Daniels Mfg. Co, Pawtucket, R. I.
Holland & Webb, 478 Broadway, N. Y.
Hyde, E. S, 223 Chestnut St, Phila, Pa.
Jenckes, E., Manufacturing Co, Pawtucket, R. I.
Kerr Thread Co, Fall River, Mass.
King, Alex, & Co, 54 Leonard St, New York.
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Monument Mills, Housatonic, Mass.
New England Thread Co, Pawtucket, R. I.
Orswell Mills, Fitchburg, Mass.
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Sanford Spinning Co, Fall River, Mass.
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Walcott & Campbell Spinning Co, New York Mills, Oneida Co, N. Y.
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White, James F, & Co, 54-56 Worth St, N. Y.
Whittier Cotton Mills, Lowell, Mass.

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Holland & Webb, N. Y.

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Eichmann & Sternberg, 530 Broadway, cor. Spring St., N. Y.
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Holland & Webb, New York.
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Eichmann & Sternberg, New York City.
Holland & Webb, New York.
Indian Orchard Co., Indian Orchard, Mass.
Malcolm Mills Co, 229 Chestnut St, Phila, Pa.
Montgomery & Co, J. R, Windsor Locks, Ct.
Skerry, A. T, & Co, 47 Leonard St, N. Y.

Silk Yarns.

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Holland & Webb, 487 Broadway, N. Y.
Ryle, Wm, & Co, 54 Howard St, N. Y.

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Worsted Yarns.

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Solis, Andrew J, Jr, & Co, 179 Devonshire St, Boston, Mass.

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The advertisers in the following columns should be addressed in care of TEXTILE WORLD, or inquiries concerning them may be addressed directly to "Information Department, TEXTILE WORLD," as full particulars of each advertiser are on file, and the addresses of suitable agents, superintendents and foremen for every branch of the textile industry will be furnished to manufacturers.

Any subscriber may file his application, and no charge is made until position is secured.

The business of this department is held strictly confidential.

The applications of good overseers in every department, who are in want of positions, are solicited.

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1227 **A Superintendent** with a thorough practical training in all the departments of a woolen mill making worsted cassimeres, dress goods, cloakings, overcoatings, robes, blankets, shawls, etc. Has a thorough knowledge of designing and has held position in first class mill, to which he can refer.

1231 **Manufacturer.** One who has had a thorough experience in the management of a mill of his own, and who can show proof as to his ability, is now in the market for a position as superintendent or assistant superintendent with any good company. Age 40; married.

COTTON SUPERINTENDENTS.

1337 **Assistant Superintendent.** Expert on book binder's cloth, window shades, fan cloths, friction callender machines. 20 years with Wilson & Bentleys, London, and about 2 years employed in this country. Age 45, married. American and English references.

1332 **Supt. with long experience** in both Northern and Southern mills. Has started 3 Southern mills, on print cloths, broad and narrow sheetings and fine shirtings. First class references from all past positions. Age 48. Might accept position as overseer of large weave room.

1265 **Superintendent** wants position as superintendent of cotton cloth mill. Has had charge of each department in the mill; aged 28 years; married.

1266 **Cotton** superintendent wants position. Out on account of mill shutting down. Understands fancy and plain cottons, white and colored. Has a first-class record.

1267 **Cotton** superintendent or carder. Prints, sheetings, ginghams, fine and coarse, white and colored. Nearly all kinds of machinery. References all right. Age 47; married.

578 **Cotton Superintendent** with experience as boss carder, master mechanic and superintendent on prints, sheetings, twills and sateens. An American of high character, and whose ability is proved by past record. Age 35, married; can accept position at once.

1306 Young American wants position as cotton superintendent. Experience mostly on cotton warps. Has been bookkeeper, overseer of carding and spinning; also superintendent in Massachusetts mills.

WOOLEN CARDERS.

1358 **Wool Carder**, now employed as second hand in large mill. Highly spoken of by past employers, habits, character and ability A1. Capable of taking charge of a room. Experience on high and low grade stock. Age 27. American, married.

1357 **Woolen Carder** now employed in satinet mill, has had 11 years' experience on fine goods and wishes to get back to that work; qualified to take a first class job. Age 39, English, married.

1307 **Carder** with unusually fine record and very wide experience desires good position in New England, Central or Western States. First-class references from past positions. Age 44. Experience on cassimeres, cheviots, dress goods, broad-cloth, repellants and blankets.

1309 **Woolen Carder.** 21 years' experience in charge at first-class mills. Has worked on fancy cassimeres, cheviots, meltons and kerseys. Age 45; married. At present out of work.

1230 **Superintendent or Carder and** spinner wants position in woolen mill. Age 30; married. Can take position at once. Familiar with jeans, cassimeres, flannels, knit goods and shoddies.

1347 **Woolen Carder.** Seventeen years' experience. Cassimere and hosiery yarns. Age 39, married; well recommended. Mill where last employed shut down.

1321 **Boss Carder.** Over 30 years' experience in woolen mills. American. Will except second hand position in large mill. Well up on dress goods, broadcloths, flannels, kerseys, etc. Has best references.

1314 **Woolen Carder.** American. Age 30. Married. At present employed. Experience on beavers, cassimeres, cheviots, dress goods. Well spoken of by former employers. A first class man for a small mill.

COTTON CARDERS.

1339 **Cotton Carder**, young man holding first-class position in New York State, would like position in Eastern or Middle States as assistant superintendent or boss carder paying $5.00 or more a day. Is worth that salary; experience and references of the best.

1277 Young Frenchman, with wide experience and good references, wants position as boss carder. Age 38; married.

1366 **Second Hand Cotton Carding,** at present employed, but want to change for position paying $2.50. Experience from .34 to 2.70 hank roving, white work in first class mills. Well recommended.

1260 **Young Man** who has worked up through carding rooms of some of the best mills in New England, wants position as overseer in New England or Middle States. Age 27. Not married.

1238 **Second** hand of cotton carding. 37; married. Open for engagement.

1315 **Cotton Carder.** Over 20 years' experience as overseer in first class mills. At present employed. Well up on prints and light and heavy sheetings. Knows American and English cards, and speeders. Best references.

1320 **Cotton Carder.** 12 years' experience as overseer in first class mills. Can refer to well known mill men. Age 39. Married.

WOOLEN SPINNERS.

1299 Woolen Spinner who has had experience as second-hand would like a position as boss spinner. Would accept small salary to start. Has worked on cloakings, dress goods and Scotch tweeds in New England mill.

1287 **Young Man** wants position as boss spinner. Experience in first-class mills on cassimeres, kerseys, cheviots, satinets; knows Davis & Furber, Paul and Johnson & Bassett machines. Age 29. Wife works in mill.

1195 **Spinner, Woolen.** American; age 31; married. Experienced on yarns from 1 to 7 1-2 run. Refers to past and present employers. Wants position as overseer. Will not go to Southern States, Canada or Connecticut. Is an experienced overseer.

1112 **Overseer of Woolen Spinning** wants position. Has first-class references. Age 37. Wages reasonable. Will accept second hand's position.

1276 **Spinner,** woolen. Wool and shoddy from 1-2 to 10 run, cassimeres, flannels, dress goods, underwear and blankets. Davis & Furber, Furbush & Sons, Johnson & Basset, and Schmidt machinery. Good references.

1204 **Situation wanted** as boss spinner, or second hand and mule fixer on Platt mules. Many years experience on yarns for dress goods in England, and also yarns for fine woolen cloth. 35 years old and married; good references.

1316 **Overseer Worsted Drawing** and spinning. Will accept first class position at $3 or more per day. At present employed in well known and first class mill. Age 42. Married. Best references from former employers.

COTTON SPINNERS.

1284 **Eleven years as Overseer** in first-class gingham mill, with other experience, has fitted this man for good position in charge of ring spinning, spooling and warping. Age 40. French American; married.

1223 **Wants position as Overseer of** Spinning or Twisting, or both. Familiar with fine or coarse numbers. Refers to past and present employers.

1272 **Second Hand** of cotton ring spinning wants position in Massachusetts, Rhode Island, Maine or New York. Age 23; married.

1364 **Cotton Spinner, mules or frames** Early training in England, 5 years in New England mills, yarn 20s to 120s. Because of misfortune would accept second hand job. Excellent reference for character and ability. Age 32, married.

1350 **First-Class Ring Spinning** overseer, also spooling, warping, slashing, web drawing; large experience, highest references as to skill, character and executive ability. At present employed in Fall River. Age 48, American.

1344 **Mule or Frame Spinner,** is at present employed in first-class print cloth mill in New England, where he has been for 9 years. Can take charge of room. Age 28, married; good references from present place. Wants $3.00 or more.

WOOLEN WEAVERS.

1340 **Worsted Weaver** would like position in a small mill at moderate salary; experience as fixer and in cloth room. Age 38, married. Knowles and Crompton looms; references good.

1253 **Weaver, Designer or Superintendent** Open for a position. Refers to past and present employers. Aged 47; married. Worsted cloakings, cassimeres and dress goods.

1130 **Overseer of Woolen Weaving** wants position. Would accept 2nd hand's position in a good mill. American; protestant; age 36; single. Good man on Knowles fancy and plain looms, also Davis & Furber. Cassimeres, worsteds, meltons and flannels. Will not go South, West or Pennsylvania.

1273 **Woolen** weaver wants position. Age 35; married. A first class man.

1313 **Woolen Weaver.** First class references, and experience on fancy cassimeres, kerseys, beavers, dress goods, etc. At present not employed, for good reasons. Age 44. Married.

140 **Worsted Weaving Overseer** with 12 years' experience as overseer, designer, and superintendent. Has tried another business for a few months and now wants to go back to the mill. Excellent references, habits all right. A skillful weaver and manager. Age 33, married, American.

COTTON WEAVERS.

1297 **Overseer of Weaving.** A man of the very best standing desires a permanent position in first-class mill. He has worked in several of the best mills in New England for upwards of twenty years, and can show splendid references. Has worked on sheetings, prints, sateens, fancies, lenos and plaids. Now unemployed.

1353 **Overseer Cotton Weaving,** who has worked up from fixer to overseer in good mills, wants position paying $3.00 or more. Scotch, age 29; experience on all kinds sheetings and sateens.

1334 **Jacquard and Dobby Weaver** and designer on Knowles machines, 8 years' experience in this position. At present employed and can furnish excellent references. Age 38; married.

1333 **Overseer of Cotton Weaving** with more than 20 years' experience in weave rooms of N. E. and Canadian mills. Experience on all kinds of white and colored, plain and fancy work, except Jacquard, American and English, looms. Married; age 37.

1288 **Overseer of Cotton or Worsted** weaving wants position. Familiar with all kinds of looms; plain or fancy work. Age 45; married.

1343 **Boss Weaver or Spooler** whose long experience as a manufacturer in England of all kinds of spread and fancies, and later in Canadian mills from sheetings to dress goods and Jacquard work, qualifies him for a first-class position; highest references. Can start immediately.

1247 **Elastic** weaver wants position as overseer. Used to cotton web, elastic suspenders, silk neckwear, dress goods and handkerchiefs. 23.

FINISHERS.

1351 **Woolen and Worsted Finisher** with 7 years' experience as overseer in R. I. and N. Y. mills, from which he has excellent references. At present second hand in one of the best worsted mills in N. E. Habits first-class; age 29, married.

642 **Knit Goods Finisher** at present out of employment because of change in superintendent. Englishman who learned his trade in Nottingham and has since been overseer 14 years in large Canadian and American mills. Married, age 46. First-class manager of help.

1359 **Woolen Finisher** of all kinds of woolen goods; 20 years in charge, at three leading mills. At present out of employment; expects $4.00 a day. Age 45, married; references first class.

1041 **Woolen Finisher.** Has had experience on fancy and piece dyed goods, cassmeretes, cheviots, worsteds, kerseys and dress goods. Wants position as overseer or second hand in New England States. Age 26 years. Will work for $2.50 per day.

1330 **Expert Finisher** with 10 years' experience in European mills. Can do perfect work on highest grade cassimeres, serges, cheviots, kerseys, worsteds, astrachans. Age 34; married. German, speaks English imperfectly.

DYERS.

1302 **Young Dyer** wants position as second-hand or overseer in small mill. Has been under good men in well-known mills.

1354 **Dyer of Large Experience** both in woolen mills and in job dyehouses. A man of far more than average skill from raw stock to piece dyeing, dress goods, etc. Scotch, married; age 39.

1355 **Wool and worsted Dyer,** a young man with 5 years' training by one of the best dyers at one of the largest mills in N. E. Experience on worsted and woolen cheviots, clays, worsteds, suitings, cloakings, beavers, dress goods, carriage cloths, yarn, slubbing, wool. Would be able to take charge of small high grade small plant.

1360 **Wool Dyer or Assistant,** 6 years' training as assistant on shoddy and wool piece dyeing. French American, age 24, single, well recommended.

1361 **Wool Dyer and Finisher,** large experience on blankets, all kinds of flannels, felts and dress goods. Early training in Scotland, 15 years in this country. Now employed, but wants to locate in the North near the sea. Age 40, married; now giving entire satisfaction.

1327 **Skillful Dyer** with experience on raw cotton and wool, indigo blue vats, slubbing, worsted and woolen yarn, piece dyeing on ladies' dress goods and men's suitings. Age 45; married. First class references from good mills.

1319 **Boss Dyer.** Wool, cotton, or raw stock. Alizarine colors; shoddy, carpet yarns, straw goods, beavers. Blue-blacks, all kinds of fancy dyeing. Belgian. Age 29. A thorough master of his trade.

1323 **Dyer** of large experience on cotton chain and skein work. Age 40; married. At present employed, but wants higher wages. References from good mills.

KNITTERS.

1257 Superintendent of knitting mill wants position; is a finisher and understands every part of the business, including shipping all kinds of goods, fabrics, cotton, worsteds, silks, wool on all kinds of shapes, and flat goods; most all kinds of knitting machinery and finishing machinery; age 32; married; refers to past record.

1274 A man who thoroughly understands the manufacture of hosiery from the fleece to the case, and is a good manager. Desires to correspond with parties wishing to employ such a man.

1362 **Boss Rib Knitter**, young man, now second hand in fleece lined underwear mill in New York State wants to advance. Very highly spoken of by present employers as to both ability and character. Could change on short notice.

1317 **Knitting Overseer.** Wide experience. Age 36. Not married. Has worked on fleece lined underwear, elder downs, stockinet, jerseys, etc. Familiar with spring needle circular machines First class references.

1342 **Hosiery or Underwear Supt.** A practical knitter familiar with latch, spring needle, and sewing machines; nearly 15 years superintendent of New England hosiery mill, at present shut down. Good manager; references first-class. Age 47; married.

1338 **Boss Knitter** of sweaters, cardigans, etc., familiar with Lamb and and German machines; 6 years in charge of knitting for first-class manufacturers. Age 33, married. At present out because of mill shutting down.

DESIGNERS.

1275 **Designer** or assistant. Age 25; married. A good man on cotton or worsted fancy dress goods. Jacquard and box looms.

1263 **Assistant** Designer or Assistant Superintendent. Has received a practical mill experience, and is a graduate of the Philadelphia Textile School. Unions, cassimeres, suiting, cloakings. Age 24 years.

1252 **Designer, Weaver or Dresser.** Aged 40 years; married. Familiar with nearly all kinds of men's wear, piece dyes, etc. Refers to past and present employers.

1259 **Woolen Designer or Supt.**, 10 years' experience on meltons, kerseys, beavers, and dress goods. Thorough knowledge of color mixing and picking out. Best of references from past positions. Age 39, single

1326 **Graduate Phila. Textile School** wants position as assistant superintendent or designer in cotton mill. Has also had 3 years' practical experience in mill. Very highest references.

1329 **Accountant or Secretary** thoroughly competent to assume full charge of any set of private, partnership or corporation books. Would take small amount of stock in Southern cotton mill and act as secretary and accountant. Temperate, energetic, excellent references. Age 30; married.

9999 **Superintendent Print Works.** Young man, 30 years of age, energetic and practical, graduate chemist, with thorough experience in printing, especially of silk (2 years in Europe and 4 in this country), seeks position as superintendent or assistant in print works. Address Chemist, care TEXTILE WORLD.

MISCELLANEOUS.

1365 **Assistant Supt. Underwear Mill.** Experience mostly on flat goods, is an expert bookkeeper, understands making cheap goods, finishing, and general knowledge of machinery. Moderate salary. Age 39, married, American.

1301 **Book-keeper and Paymaster.** Young man of the very highest character desires to move away from the Atlantic coast, on account of his health. Best references from his present and former employers.

1283 **Laboratory Chemist** with experience in large mills and supply house desires position. A moderate salary.

1336 **Beaming and Slashing.** Experience in Mass. and Me. cotton mills on ginghams, dress goods and all kinds colored goods. Age 30; habits first-class, good references. At present employed in large mill.

1335 **Loom Fixer or Second Hand.** Knowles and Crompton looms, fancy worsteds and cassimeres, dress goods. German; Protestant; age 37, married. Has been employed in good mills and is very well recommended.

1345 **Master Mechanic.** In charge of one large plant for past 16 years, and previous to that 6 years in charge for one of the largest mills in New England Capable of accomplishing best results at low cost; references from leading engineers and managers.

1346 **Chemist or Salesman.** Graduate Crefeld Textile School, colorist for German manufacturers, and since employed for 3 years in this country as colorist. Young man, single.

1341 **Dye-Stuff Salesman**, with experience in dye house for several years; many friends and relatives as dyers. Would start on small salary and expenses. Age 30, single. Might take second hand job in dye house.

1312 **Overseer Dresser.** Age 34. Married. Is at present working in a first class mill. Desires to change because of poor health of family. Can furnish first class references. Cassimeres, unions, woolens.

1363 **Twisting, Spooling, Warping** overseer. Experience on single and twisted yarns up to 2/100s in one of the best New England mills. Now employed as assistant; young man, but is confident that he could satisfactorily fill overseer position.

1356 **Second Hand Cotton Spooling**, warping, twisting, slashing, or could handle overseer position in small mill. Well recommended, now with good mill.

1202 **Silk Superintendent** is open for an engagement with a first-class company. Has a thorough knowledge of all the details connected with the manufacturing of silk ribbons and hat bands, from throwing to the finished product. Has held the position of superintendent of a first-class mill for several years. Under 30 years of age, and married. Has the best of references. For any further information address this paper.

1229 **Dresser.** Overseer of woolen dressing. Age 30. Men's wear and dress goods. Good references.

1228 **Shearer.** Wants position as overseer of shearing. Good man on cassimeres, worsteds, unions and cheviots. Age 25; married. References.

—Porcelain Guides.—

1001—1¼" Screw.

119 G

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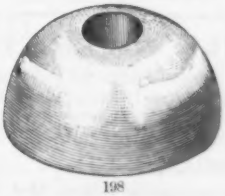
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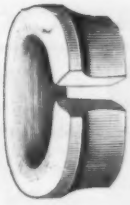
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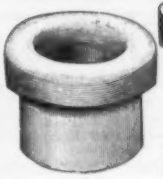
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97 S/4

1026

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97/2½

97/4

97 S/2½

64

We present in this issue, cuts of a few patterns of our porcelain guides specially adapted to the worsted trade. As we carry an endless variety in stock and make many special ones to order, we cannot present them all but will furnish catalogues and samples on application. All the articles of our manufacture are made of genuine hard porcelain. The body and glaze being of the same materials and fused together at the highest heat, the guides are of uniform hardness. This is a matter of great importance as the ordinary Pot guides are made of a porous body covered with a soft glaze, which is soon cut through by the action of the thread.

Mitchell, Bissell & Co., New York.

4000

4001

WORSTED GUIDES IN IRON and ALUMINUM CASTINGS.

Southern Cotton Mill Bonds and Stocks.

The best paying investments with the least element of danger—netting investors 6 to 8 per cent. free of taxes.

APPLY TO

C. M. HAWKINS & CO.,

RALEIGH, N. C.

We refer to the banks in Raleigh.

POSTAL Cards Bought.

Cash paid for uncancelled printed or addressed postal cards that have been laid aside by business houses as of no further use.

If you have any, call or write.

SWAIN MAUFACTURING CO.

26 BEEKMAN STREET, NEW YORK CITY.

CLOTH BOARDS —AND— BOX SHOOKS.

I know just what manufacturers want and can supply them at the bottom prices. Write me.

E. A. FLANDERS,

North Dexter, Maine.

SILK WIPERS vs. WASTE.

There is no substitute for cleaning all kinds of machinery equal to my SILK WIPERS. Largest size and best quality, with TWO SELVEDGES to every wiper. They are **cheaper and more efficient** than Waste. Samples and prices on application to

SETH WILKINSON, Pawtucket, R. I.

Philadelphia Office, 164 Montgomery Ave.

Recent Sales of Mill Shares.

	lowest.	highest.
Lancaster	299	300¼
Stark	830	835
Amory	122¾	123
Everett	60	60
Manchester	100½	100⅞
Hamilton	640½	650
Amoskeag	1300	1307½
Hamilton	640	649½
Tremont and Suffolk	131¼	133¼
Great Falls	130⅝	130⅞
Merrimack	926	927½
Pacific	1895	1910
Atlantic	50	50⅜
Naumkeag	50	50
Appleton	250	252½
Cocheco	177	178
Tremont and Suffolk	130	130
Lowell Mfg.	500	525
Lyman	57	58¾
Massachusetts	80	81
Middlesex	118¾	118¾
Border City	108	108
King Philip	90	90
Stafford	100	100
Union	142	142
Cornell	101	101
Sanford Spinning	93½	93½
Lawrence	104	105
Bates	100	100¼
Chicopee	50	50

—Linings made for overcoatings and mantle cloths are generally composed of woolen and worsted yarns, with occasionally a few silk threads introduced to give richness and tone to the pattern.

Water Power in Georgia.

For Sale: A fine water power (estimated twelve thousand horse) and 540 acres of land, about 100 miles from Atlanta, Ga. Railroad, Express and Telegrap service; a clear mountain stream suitable for bleaching. For full particulars address

S. S. RAMBO, Tallepoosa, Ga.

To Manufacturers.

A factory with Railroad Switch east of New Haven. Cost $30,000, price $8,500. 20,000 feet floor space, 100 horse power boiler, 85 horse power Corliss engine. Village and help. Special inducements. Particulars and photographs on application. (Folio 8345).

PHILLIPS & WELLS, Tribune Building, New York.

Glove Shop.

For Sale: Glove shop, stock and machinery for the manufacturing of Fabric Gloves. Address

P 161, Textile World.

Factory with Water Power For Sale.

Hudson River, 42 miles from N. Y.; vessels load at mill door; West Shore RR. crosses premises; ten acres; extensive dock; mill five floors, 40 x 60; power heavy and unfailing; desirable for business needing cheap power and transportation; a bargain. Apply to owner

W. C. ANTHONY, Newburg, N. Y.

MILL SUPPLY BUSINESS FOR SALE!

An old established Cotton and Woolen Mill Supply business, with very desirable connections and good line of customers, is offered for sale for personal reasons. Located in Massachusetts. Business in good shape; can do $50,000 per year. Address in confidence.

"COLUMBIA," care Textile World.

Bonus.

A large bonus in money is offered by the "Board of Trade," of Fort Covington, Franklin County, N. Y., to a manufacturing company who will locate in our town. For full particulars, address

W. G. CUSHMAN, Sec. and Treas., Board of Trade, Fort Covington, Franklin County, New York.

WANTED.

A Gentleman with moderate capital to take an interest in a very desirable Yarn Commission business in New England. Address, "YARNS," care Textile World.

COTTON DYER WANTED.

Wanted, a good practical dyer to take charge of a small raw cotton stock plant, must be steady and reliable. State age, experience, and salary wanted.

Address WORKER, care Textile World.

MACHINERY Shafting, Hangers, Pulleys and Couplings. Machinery Steel in all sizes from 6 1-2 inches diameter down to 5-16 inch diameter, cut any length, always in stock. Cold Rolled Rounds, Squares, Flats, Hexagons, Octagons, Decagons, and all shapes finished to exact sizes. Everything in readiness to be shipped at once. Our goods are without a rival and our prices the lowest of all.

Telephone 314, South Boston.

COMPRESSED STEEL SHAFTING WORKS,
South Boston, Mass.

Ramie.

An intelligent and practical man, who has worked for a long time in one of the few successful factories in Europe which manufactures ramie into imitation silk, woolen and linen goods, would like to arrange with some manufacturer for the introduction of this industry. He understands all the processes from raw material to the finished goods; is able to spin the yarn up to 100s single.

Also understands how to color a fast aniline black without oxidizing, also how to color perfectly fast paranitraniline red in warps or skeins. Address

"AMERICAN CITIZEN," care Textile World.

Hosiery Mill For Sale or To Let!

A new plant, capacity 100 dozen per day.

Water Power To Let, 400 H. P., with excellent buildings.

W. K. DANA, Westbrook, Maine.

EDWARD JEFFERSON & BRO.,

Worsted .·. Machinery,

28 Strawberry Street,

PHILADELPHIA, - - PA.

SOLE AGENTS FOR

J. B. Farrar & Sons, Halifax, England,

Buggella Cork Rollers for Spinning and Drawing.

The South.

Progressive men are beginning to recognize that cotton mills can be operated on a more profitable basis in the cotton-growing section, than in any other part of the country. Besides cheap raw materials, labor is cheap, and hours of labor longer. A number of cities along the Cotton Belt offer exceptional opportunities for the successful operation of cotton mills, and the citizens hold out liberal inducements to secure their location. Transportation facilities to all of the large jobbing centers are unexcelled. For full particulars, write

J. ST. KOSLOWSKY, Industrial Agent Cotton Belt Route, St. Louis, Mo., or

E. W. LABEAUME, General Passenger and Ticket Agent, Cotton Belt Route, St. Louis, Mo.

ONE-HALF A MILLION PEOPLE WILL VISIT THE

TWENTIETH Triennial Exhibition

OF THE

Massachusetts Charitable Mechanic Association,

OCTOBER and NOVEMBER, 1898.

Textile manufacturers are invited to exhibit their specialties. Electrical apparatus will be made a special feature. All machines will be electrically driven. Preference will be given to parties desiring to present working exhibits. Entrance fee, Five Dollars for mechanical exhibits. No charge for space or rental. Power furnished free. Prospectus, rules and conditions and floor plans on application to HENRY D. DUPEE, Mechanic's Building, Boston, Mass.

Frank A. Stevens, *Pres.* Arthur H. Mason, *Treas*
Capital Stock, $500,000.

Sanford Spinning Co

FALL RIVER, MASS.

30,000 Spindles. Weekly product, 50,000 pounds 14s to 40s.

NOVELTY COTTON YARNS,

FROM AMERICAN PEELERS AND EGYPTIAN COTTONS.

OUR SPECIALTY: Superior qualities of Hosiery Yarns, Natural Shades of Cottons, and in Colors, Jaegers, Mixes, and Bleached, Hosiery Cops on Long Tubes, Skeins, Tubes, Cones and Lisle Thread Yarns. Furnished in Carded and Combed Qualities in Singles, 2, 3 and 4-plies.

The Best is the Cheapest.

It is BETTER and CHEAPER to wind yarn by the "Universal" system before shipment from the mill, thus insuring perfect delivery to knitting machines without rewinding.

UNIVERSAL WINDING CO.,

F. H. BISHOP, Manager.

226 Devonshire St., - Boston, Mass.

YARN DEPARTMENT.

Eastern Yarn Market.

Cotton Yarn. Spinners are running full, with more orders than they can well handle. This applies both to mule spun and ring spun yarn. Wool has advanced to such an extent on account of the tariff that buyers have been calling for garments made from cotton yarn. Underwear manufacturers are selling cotton garments in place of wool garments, and cloth manufacturers are buying tons of ring spun yarn in 2/30s and 2/40s size to take the place of worsted yarn. The spinning mills, both in the South and East, are running full, and the demand for yarn is so great that it is hard for weavers and knitters to get deliveries of yarn ordered on time. These large weaving mills placing orders for 1,000,000 pounds of ring spun yarn in 2/20s 2/30s and 2/40s, is a new factor, and spinners h ve to hustle to get the yarn out and supply regular customers. The much talked of combination is not an iron-clad arrangement. It is only a gen'emen's agreement to make prices at a certain range. It is well adhered to, on account of the uselessness of manufacturing yarn at a loss. Prices have an upward tendency on account of the great demand. The light weight season on underwear is about over, and orders are now being placed for heavy weight yarn. Fleece-lined garments continue to be in great demand, and yarns in 1/20s and 1/30s are required in colors. For ladies' ribbed underwear the sizes run in 8, 9 and 10s silver gray, and in men's ribbed, 10s and 12s Jaeger. The finer qualities of combed Egyptian are not in so great demand now that the heavy weight season is on. Much of this yarn is being sold in 9s, 10s, and 20s. The cotton yarn business was never in so prosperous a condition.

7/8 white cops	. . . . .	13½	cts.
10s " "	. . . . .	14	cts.
12s " "	. . . . .	14½	cts.
14s " "	. . . . .	15	cts.
16s " "	. . . . .	15½	cts.
18s " "	. . . . .	16½	cts.
20s " "	. . . . .	17	cts.

Silver gray and Jaeger.

10, 11, 12	. . . . .	16	cts.
14	. . . . .	16½	cts.
16	. . . . .	17	cts.
18	. . . . .	17½	cts.
20	. . . . .	18	cts.

Combed Egyptian, 1/20,		24	cts.
" " 1/30,		30	cts.
" " 1/40,		34½	cts.
" " 1/50,		37	cts.

Woolen Yarn. Spinners are getting but few orders. The whole trade seems to be at a standstill. Spinners say they could get orders at last year's prices, but this is out of the question with the advance in wool. Some orders are being placed for the lower grades, but they are few and far between. Some believe the cause is to be found in the war scare, others that the advance is caused by the high wool duties which have unhinged the whole foundation of manufacturing, and buyers are withholding orders waiting until actual requirements force them on the market. The cheaper grades of underwear and hosiery are selling. The better grades, which are well established and whose makers got orders early in the season and covered on stock so as to sell without being obliged to get the whole limit of the advance, are busy, but the great majority of spinners are getting but few orders, although sample orders are coming to hand from time to time. The heavy weight woolen men are having a hard business and no orders are being placed for backing yarn. It is to be hoped that this state of affairs will soon change, as the best grades must soon be in demand. It is said that the wool men who sold freely during Oct., Nov. and Dec. of last year are the only ones who have received the full benefit of the increased tariff rates. Those who waited for January 1st before

(Continued on page 131.)

Frank E. Patterson, Prest. Oscar W. Wood, Treas

Germantown Spinning Co.

COTTON CARDED

HOSIERY YARNS

In numbers from 6s to 26s.

Germantown, Philadelphia.

Glazed, Bleached and Dyed

YARNS

Cone Winding.

W. WARREN THREAD WORKS.

WRITE US WHAT YOU USE, WE WILL DO THE REST.

WESTFIELD, - MASS.

WOOLEN YARNS.

Single, also Double and Twist For Weaving Hosiery.

COVERT CLOTH YARNS A SPECIALTY.

Raw Stock and Piece Dyeing.

CLEAR RIVER MILLS,

PASCOAC, R. I.

(Continued from page 129.)

selling, now own wool which has no buyers, and although we do not believe that Australian wool so held will be sold for less than prevailing prices, yet the interest and storage account will eat up much of the anticipated profit. Manufacturers and spinners in Europe are not having good business, chiefly owing to diminished exports, in which no distinct revival is at present noticeable. A continuance of the buoyancy, manifest at the last auctions, appears, therefore, largely to depend upon a continued strong support from the United States. It would seem that the situation is fast leveling itself, so that we shall later be able to know just where we shall stand. We note a growing demand for thread waste of Australian quality, and black combed wool and black wool. Underwear buyers are beginning to know the difference between garments made with dyed wool and garments manufactured with the pure black combed wool, and are demanding the real article rather than the substitute, because garments made with black dyed wool, fade, after the first washing, while the real black wool does not fade and is the genuine thing. Combed wool is used entirely by German manufacturers of natural underwear.

Worsted Yarn. Are the spinners sick? Yes, the worsted spinners are very, very ill, and this is the reason: Worsted yarn has declined during the last 10 or 12 days, from 8 to 10 cents per pound, and orders from the weavers are not to be had. Cloth is selling in New York, 23 ounces to the yard, for $1.00 per yard. With yarn in 2/40s at $1.00 per pound, there seems to be a big difference between these two figures. The buyers of cloth, not being able to stand the great advance

(Continued on page 133.)

LINEN YARN IMPORTER.
Hughes Fawcett, 115 Franklin St., New York,
Flax, Hemp & Jute Line and Tow Yarns,
FOR WEAVING PURPOSES
Linen Jacquard Harness Twines.
Fine Cotton Harness and Heddle Twines.
For Cotton, Silk, Woolen and Carpet manufacturers. Correspondence solicited. Samples promptly furnished.

CATLIN & CO.,
YARNS.
67 Chauncy St., Boston
216 Church St., New York.
206 Chestnut St., Philadelphia.

SAWYER, STONE & CO.,
YARNS,
86 & 88 Franklin St., NEW YORK.

ALEX'R KING & CO.
YARNS.
FINE IMPORTED YARNS A SPECIALTY.
54 Leonard St., New York.

JAMES E. MITCHELL & CO.,
Commission Merchants.
122 & 124 Chestnut St., Philadelpia, Pa.
51 & 53 Summer St., Boston.
Cotton, Woolen & Worsted Yarns.
All numbers on Hand and Made to Order.

O. S. HAWES & BRO.,
WEAVING and HOSIERY **YARNS,**
All Plies and Numbers.
Imported Yarns a Specialty.
82 and 84 BEDFORD ST., FALL RIVER, MASS.

TUCKER & COOK MFG. CO
MANUFACTURERS OF
WHITE AND COLORED COTTON **WARPS**
Nos. 6s to 30s,
On Beams, Jack Spools or in Chain
CONWAY, MASS.

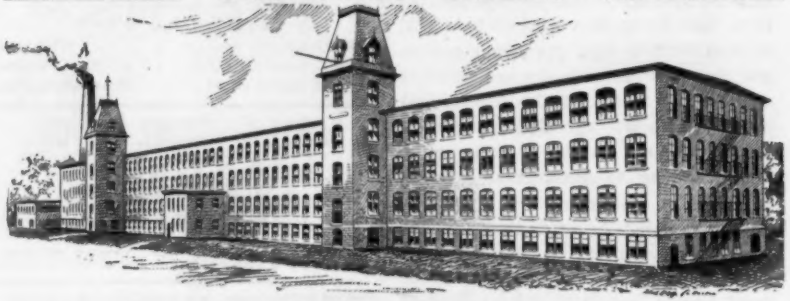
GRANT YARN CO.,
COMBED AND CARDED COTTON
YARNS 40s and above. AND
FITCHBURG, MASS. **WARPS**

E. JENCKES MFG. CO.
Colored Cotton, Hosiery, Woolen and Merino **YARNS**
PAWTUCKET, R. I.

CAPACITY, 50,000 Spindles.

ORSWELL MILLS

FITCHBURG MASS.



COMBED OR CARDED

COTTON YARNS

In Chains and Skeins, on Balls, Beams, Spools—single or twisted.

The J. R. MONTGOMERY CO.,

WINDSOR LOCKS, CONN.

Mercerized Cotton Yarn in two or more ply. Gives a permanent lustre equal to spun silk.

Novelty Yarns, Mohair Loops, Cotton Flake and Nub Yarns.

High Grade Cotton Warps, in colors, on beams, in chain warps or in skeins, single or two-ply.

Printers of Cotton, Wool, Worsted or Silk Yarns.

MONUMENT MILLS,

Manufacturers of

White, Colored, Fancy and Double and Twist,

COTTON WARPS

HOUSATONIC, MASS.

4s to 60s.

Cotton Warps.

WHITTIER COTTON MILLS,
LOWELL, MASS.

INDIAN ORCHARD CO.,

Indian Orchard, Mass.

MANUFACTURERS OF

Lustred Cotton Yarns.
In Various Colors and Twists.

NOVELTY YARNS
In Cotton, Silk and Worsted, in various patterns and colors.

Cotton Warps and Yarns
In Gray and all colors, single or 2, 3, 4 and 6-ply, and Cable Cord.

COLORED COTTON
Machined, Carded or in Roving.

(Continued from page 131.)

caused by the sharp advance in wool, are placing orders for cotton worsteds with 80 per cent. cotton yarn and 20 per cent. worsted yarn, and some even less. Worsted yarn buyers are refusing to order the better class of cloth and as a result the Rhode Island manufacturers, who have been making decent cloth, are getting no orders. We hear from reliable authority that one of the large Rockville Mills has secured thus far but 200 pieces to run the whole heavy weight season. The importance of this is that it will take the mill in question just two weeks to manufacture the whole 200 pieces. This is said to represent the state of the fine worsted trade. On the other hand, the Burrillville manufacturers are very busy manufacturing cotton worsteds, and have all the business. It is estimated that there has been more cancellation in the woolen industry during the last three or four weeks than has ever been the case in the history of the woolen industry. It is estimated that over 30 per cent. of the orders placed during the early part of the season have been canceled. We hear of many sick spinners. One called on a manufacturer and agreed to make his yarn at any price provided he would give him an order and thus prevent his mill from shutting down. We hear of another spinner who had a chance to take an order which would have netted him a profit of $10,000, which he refused because he said he was going to make $20,000. The result is, today he is trying to get his old offer, but he cannot, and the chances are, according to the present outlook, that he will have to wait some time longer. Manufacturers feel that they have a grievance against the wool dealers for advancing wool so rapidly, in that the advance has been so great that the buyers of cloth refuse to pay the enhanced cost, with the result that preference is given to cloth with more or less cotton, and cotton underwear instead of wool. The knitters are having some inquiry for goods made from lustre yarn. French spun yarn is in more demand, and, at a price, orders are being placed by knitters of underwear and hosiery. Many of the knitters, however, placed orders early in the season, and have a good supply of yarn in stock. Some have enough to carry them until July, and some knitters are holding off until the business improves. It is an unsatis-

(Continued on page 135.)

KERR THREAD CO.
—SPINNERS OF—
Fine Combed Sea Island **COP SINGLES**
All Numbers, 30s to 150s.
Fall River, Mass.

WOOLEN AND MERINO
YARNS.
Special line for Bicycle and Golf Goods in all shades
For Hosiery, Gloves, Underwear, and all kinds Knit Goods. Cop, Cone and Skeins.
The J. & H. Clasgens Co.
New Richmond, O.

WOOLEN YARNS.
All grades Woolen, Mixed and Merino yarns.
15 SETS CARDS.
EDWARD M. ROCKWELL,
LEOMINSTER. - MASS.

A. HERBST. J. W. JONES.
HERBST & JONES,
Successors to Kershaw Worsted Co.
WORSTED YARN SPINNERS,
21st & Nandain Streets,
PHILADELPHIA.

C. MOORE & CO.,
MANUFACTURERS OF
TWINES, THREADS AND YARNS.
Jacquard Harness Twines of all kinds on hand and made to order.
S.W. COR. FIFTH & MARKET STS.,
Philadelphia.

EICHMANN & STERNBERG
530 Broadway cor. Spring St., NEW YORK.
Plain and Gassed Cotton Yarns,
HOSIERY COTTON YARNS,
Mercerized Cotton Yarns (Simile).

COTTON WARPS
White or Colored.
Toweling and Grain Bags.
Dana Warp Mill,
WESTBROOK, MAINE.

ALBERT R. ELSASSER,
Clifton Worsted Mills.
Lustre Worsted Roving and Yarns
A SPECIALTY.
MILLS: ADDINGHAM, DEL. CO. PA.

HADLEY
SPOOL COTTON AND FINE YARNS
COMPANY
COTTON SPINNERS.
MILLS AT HOLYOKE, MASS.

SPINNERS OF
FINE COTTON YARNS
30s TO 100s.
Gray, Bleached, or Colored. On cop, in skein on spools, cones or tubes.
Fine Cotton Warps, single and two-ply, in chain, etc.
Spool Cotton and Seaming Thread.
95 Milk St., BOSTON.

THE WILLIAM CLARK COMPANY,
WESTERLY, R. I.
Mills equipped with the latest and most improved machinery.
Combed Egyptian from No. 20s to 100s. Combed Sea Island from No. 40s to 200s.
Also 2, 3, 4, 5 ply and 6, 9 and 12 plv cable laid.
Hosiery Yarns on Cops Tubes or in Skeins, Grey, Bleached or Dyed. (Fast Colors.

CREENE & DANIELS MFG. CO.,
COMBED, CARDED AND GASSED
Yarns, Threads, Twines and Chain Warps,
Colored and Bleached Yarns Furnished in any manner desired by the trade. PAWTUCKET, R.I.

WEAVING and HOSIERY YARNS.
We Buy for Cash
WARPS, COPS, TWIST and SOFT SKEINS, Single, Double, 3-ply, 4-ply, etc.
COLORED YARNS for HOSIERY
on Cones, a Specialty.
Correspondence Solicited.
EDWARD S. HYDE, 223 and 225 Chestnut Street, PHILADELPHIA PA.

Cotton Yarns AND WARPS Of Every Description.
James F. White & Co.
COMMISSION MERCHANTS,
54 an 56 Worth St., NEW YORK.
228 Chestnut St., PHILADELPHIA.
BURLAPS all WIDTHS and WEIGHTS.

YARNS All Numbers and Qualities.
HOLLAND & WEBB,
487 Broadway, New York.

NEW ENGLAND THREAD CO.
PAWTUCKET, R. I.
Manufacturers of Spool Cotton & Supefine Tapes
Thread and Yarn on Tubes and Cones for the Hosiery trade etc. Thread dressing a specialty, for weaving purposes. Dyers and Bleachers of Threads, Yarns and Tapes.

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Continued from page 133.

factory sight—the condition of the trade compared with the fond expectations of a big and prosperous business.

We quote:

2/40s Australian	$1.07½
2/50s "	1.15
2/20s, 3/8s Blood	.60
2/36s, 1/2 "	.75

The Philadelphia Yarn Market.

Cotton yarns have been sold, the past month, at about the same prices, as previously. Cotton advanced sharply in the South, so that it is now bringing as much money there as in New York and Philadelphia. The demand has continued good, especially on cone yarns, and two-ply warps and single warps. Many mills making single yarns have put in twisters, which has stiffened the price on single yarns very much, and still the market is bare of two-ply. We quote as follows:

WARPS.	
20/1	13 cts.
22/1	13 to 13½ cts.
26/1	14 to 14½ cts.
12/2	14 to 14½ cts.
14/2	14½ to 15 cts.
16/2	14½ to 15 cts.
14/1	12½ to 13 cts.
16/1	12½ to 13 cts.
20/2	16 cts.
30/2	19 to 20 cts.
30/2 Eastern	20 cts.
40/2 Eastern	24 to 24½ cts.
SKEIN.	
26/1	13¾ to 14 cts.
20/1	13 to 13½ cts.
19/1	13 to 13½ cts.
4s to 10s soft	11½ to 12½ cts.
12s soft	13 to 13½ cts.
20/2 medium	15½ cts.
14/2	14 cts.
30/2	19 to 19½ cts.
30/2 Eastern	19 to 19½ cts.
26/2	17 to 17½ cts.
40/2	23½ to 24 cts.
8/3	11½ to 12 cts.
10s double reeled	12 to 12½ cts.
16/3 slack	14 cts.

(Continued on page 137.)

B. F. BOYER & CO.,
Successors to GEORGE SHIMER & BOYER,
HOSIERY YARNS,
In Wool, Merino and Worsted.
GOLF YARNS,
In Wool and Worsted. Also carry a full line
BUNDLE YARNS
For the Jobbing Trade.
516 Market St., Philadelphia.
MILLS, CAMDEN, N. J.

Walcott & Campbell Spinning Co,
IROQUOIS MILLS.
FANCY HOSIERY YARNS
IN ALL COLORS.
New York Mills, Oneida Co., N. Y.

Eddy & Street,
COTTON, WOOLEN, **YARNS** AND **BRAIDS** WORSTED, SPUN SILK.
PROVIDENCE, R. I.

Cohannet Mills,
TAUNTON, MASS.
Spinners of High Grade
HOSIERY YARNS OF EVERY DESCRIPTION.
Selling Agents JAMES E. MITCHELL & CO., Philadelphia and Boston.

BURNET & CO.,
24 George Sq., Glasgow, Scotland.
All numbers and qualities of Cotton Yarns, specialities in
"Silkoline," "Ramie" and Fancies; also bleached filling on long tubes. Turkey reels, etc. A B C Code used. Telegraphic address "Tenrub, Glasgow."

O. H. HAYES & CO.
Will make liberal arrangements with Woolen Manufacturers to handle their productions.
O. H. HAYES & CO.

YARNS
SOLIS - - BOSTON.
179 Devonshire Street.
ANDREW J. SOLIS, Jr. & CO.

HOWLAND CROFT, SONS & CO.

LINDEN WORSTED MILLS.

Fine Worsted Yarns

OFFICE AND MILLS:
Broadway and Jefferson Avenue,
CAMDEN, NEW JERSEY.

ALLEGHENY WORSTED MILLS,

Thomas Wolstenholme, Sons & Co., MANFRS. OF

ALL NUMBERS SINGLE AND TWO-PLY,

Worsted YARNS,

Sell Direct,

on Cop or in Skein, for Weaving and Knitting Purposes, in White, Natural & Fancy Mixes.
Office and Mills: Frankford Ave. and Westmoreland St., Phila., Pa.

CRANSTON WORSTED MILLS.

Worsted and Mohair Yarns—white or colors, in skeins, on spools, cones, or shuttle bobbins.

NOVELTY YARNS—of Mohair and Worsted. We are the only manufacturers in the United States making these yarns from the raw material to finished product and making Yarns only.

CENAPPED YARNS of all kinds. Doup Yarns. Harness Yarns for Braids, etc.

BRISTOL, R. I.

George Campbell & Co.

Worsted Spinners,

Yarns, both French System and Bradford.

Knitting Yarns in all Grades and Mixes.
All Numbers to 60s.

21ST STREET AND WASHINGTON AVENUE, PHILADELPHIA.

MALCOLM MILLS CO.,

MANUFACTURERS OF

Novelty Yarns, Silk Noil Yarns, in Fast Colors AND White.

Mills, Frankford, Pa. Office, 220 CHESTNUT ST., PHILA.

(Continued from page 137.)

16/4 medium	14 cts.
16/2 " "	14 cts.
9/4 slack	12 cts.

SOUTHERN CONES.

6s to 8s, various qual.	12½ to 13½ cts.
10s " "	13 to 14 cts.
12s " "	14 to 14½ cts.
14s " "	14 to 14½ cts.
16s " "	15 to 15½ cts.
20s " "	16 to 16½ cts.
24s " "	16½ to 17½ cts.
26s " "	17 to 17½ cts.

SHUTTLE COPS.

6s to 8s	13 cts.
12s	13 to 13½ cts.
16s	13½ to 14½ cts.
26s	14 cts.
40s	18 to 19 cts.

MIXED COLORED CONES.

6s to 8s	14 cts.
10s	14 to 15 cts.
12s	14½ to 15½ cts.
14s	15 to 16 cts.
16s	16 cts.

EASTERN COPS.

12s shuttle	14 to 14½ cts.
10s to 12s hosiery	14 to 14½ cts.
14s	14½ to 15 cts.
16s	15 to 15½ cts.
20s	17 to 17½ cts.
24s	18 cts.

Eastern skein, ½c. above cops.

Eastern cones, ¾ to 1½c. above cops.

Egyptian, carded, 4c. to 5c. above white.

Combed yarns 4c. to 5c. above carded.

Woolen and merino yarn somewhat better demand, but still not active. The largest users of these yarns spin their own filling, which makes the job spinners very dull, both in cotton, wool spun and merino.

The demand on worsted has slackened off considerably. Spinners are filling up old orders, but the demand is not pushing at all.

SILK NOILS AND SILK NOIL YARNS
IN WHITE AND COLORS.
MOHAIR LOOPS, KNOTS, AND FANCY YARNS FOR DRESS GOODS AND CLOAKINGS.
A. T. SKERRY & CO., 47 LEONARD ST., NEW YORK.

THE PHOENIX MILLS CO.,
MANUFACTURERS OF
Fine Worsted Yarns.
Correspondence Solicited. Samples furnished on application.
BOSTON OFFICE: 620 Atlantic Ave. Rooms 10 and 11.
MILLS: 10th & Germantown Ave., Phila. Chester, Pa
PHILA. OFFICE. No. 13 LETITIA ST.

GEORGE SHIMER & SON,
Spinners of Worsted Yarn for the Weaving and Knitting Trade.
All kinds of Fancy Yarns for the Knitting Trade.
5th and Erie Sts., Camden, N. J.

WEBSTER DYEWORKS,
Manufacturers and Dealers in
Dyestuffs and Chemicals
Also Dyers of Cotton, Worsted, Hosiery Yarns, Piece Goods, Raw Stock, etc.
Address, P. O. Box 604, WEBSTER, Mass.

THE SECRET of our popularity is no secret to our customers. Experience has taught them that we give them better work and better service than they can get elsewhere.
T. BROPHY'S SONS,
Dyers of all kinds of Yarn and Cotton Warps,
Jasper Street, above Clearfield Street,
PHILADELPHIA.

NOVELTY TEXTILE PRINTING CO., Inc.,
Printers and Embossers of Textile Fabrics.
NOVELTIES IN GOLD EFFECTS, ETC.
447-449 West 14th St., New York.

FAST FANCY COLORS.
We make a specialty of dyeing Mode and Tan shade on hosiery and yarns, as also all other fancy shades. Colors absolutely fast. For particulars address
OAKDALE DYE WORKS,
913 W. York St., Philadelphia, Pa.

CHENEY BROTHERS,

SILK MANUFACTURERS.

ALL KINDS OF

Knitting Silks, Ribbons AND Piece Silks,

USED FOR TRIMMING KNIT GOODS.

TRAMS, ORGANZINES and SPUN SILKS, in the Hank, or on Spools or Cones, for Manufacturers' Use. Silk for Special Purposes Made to Order.

MILLS: South Manchester and Hartford, Conn.

SALESROOMS: 477, 479 and 481 Broome Street, NEW YORK.
79 Chauncy Street, BOSTON.
186 Franklin Street, CHICAGO.

WILLIAM RYLE & CO.,

DEALERS IN

Domestic Thrown Silk of every description. Fine Pure Dye Silks for the woolen trade a specialty. Foreign and domestic

SPUN SILK YARNS AND NOILS

Importers of European and Asiatic Raw Silk.

54 Howard St., cor. Mercer St., - NEW YORK.

C. J. LITTLEWOOD & SONS, Ltd.

ALBION

DYE and BLEACH WORKS,

MANAYUNK, PA.

DYERS of Cotton, Cotton Yarns, Wool and Raw Stock Generally. **BLEACHERS** of Cotton and Cotton Yarn.

CITY OFFICE: 132 Chestnut Street. Telephone Connection,

PHILADELPHIA. MAIN OFFICE AT THE WORKS.

COCHRANE CHEMICAL CO.,

50 Kilby St., Boston, Mass.,

MANUFACTURERS OF

ACIDS, AMMONIAS, ALUMS, SODAS

And other Chemicals.

PROVIDENCE DYE WORKS.

Dyers and Finishers,

COTTON YARNS, Suited for HOSIERY and WEAVING Cotton, Woolen and Worsted DRESS GOODS, Woolen and Worsted Mixed CASSIMERES and CLOAKINGS, also Woolen and Worsted Slubbing, COTTON YARN and WARP DYERS and BLEACHERS.

FIRTH & FOSTER CO.,

OFFICES: **Philadelphia, 546 Bourse Building.**
New York Office, Silk Exchange, Broadway and Broome St.
WORKS: **Taylor, Emerald and Adams St., Kensington, Philadelphia, Pa.**

Boston Finishing Works

WILLIAMSTOWN, MASS.

BLEACHERS, DYERS AND FINISHERS

Of Pure Finish Shirtings, Sheetings, Canton Flannels and Filled Good Also Silesias, Satteens, Corset Jeans, Cambrics, Sleeve Linings, Pocketings, Flanneletts, and all descriptions of Dyed Goods.

NAPPING A SPECIALTY.

Being equipped with the French and other Foreign and Domestic Napping Machines we are prepared to give any kind of Nap required, including the French FlannelFinish.

R. GREENWOOD & BAULT,

GLOBE DYE AND BLEACH WORKS,

FRANKFORD, - PHILADELPHIA.

Specialists in Cotton Warps and Skein Dyeing.

HOME BLEACH AND DYE WORKS,

PETER B. McMANUS, Proprietor.

Dyers and Bleachers of Cotton Yarns,

PAWTUCKET, R. I.

Pawtucket Dyeing & Bleaching Co.,

BLEACHERS AND DYERS OF

COTTON YARNS AND STOCKINET.

OFFICE WITH **BLODGETT & ORSWELL CO., Manufacturers of Glazed Yarns,**
28 BAYLEY ST., PAWTUCKET, R. I.

INDUSTRIAL DYEING AND FINISHING WORKS,

Dyers and Finishers of WOVEN AND KNITTED FABRICS,

And Cotton, Wool and Worsted **Yarns and Warps.**
Consolidation of John G. Campbell & Co. and World Dyeing Works.

3829-3845 Frankford Avenue, ... PHILADELPHIA.
City Office: 240 CHESTNUT STREET. Telephone F'd 50.

FAST COLORS

For Wool, Woolen and Cotton Yarn and Piece Goods Dyeing, and for Calico Printing

ALIZARINE RED, PASTE AND POWDER.

Alizarine Blues, Oranges, Browns, Yellows, Maroon, Gray and Black.
Cœruleine, Galleine, Mythylene Grays.
Thionine Blues, Thionine Indigo, Solid Green and
PATENT BLUES (superseding Extracts of Indigo on account of fastness and color bloom) for Wool and Silk, Benzidine and Primuline Colors, Zinc Dust, Aniline Salts and Oil.

VICTOR KOECHL & CO. 79 MURRAY ST. NEW YORK.

SOLE AGENTS FOR

FARBWERKE, formerly MEISTER, LUCIUS & BRUENING, HOECHST o | M.; A. LEONHARDT & CO., Muehlheim o | M.

BRANCH OFFICES:

Boston, Mass., 138 Milk St.; Philadelphia, Pa., 39 N. Front St.; Providence, 45 S. Main St.

New York and Boston Dyewood Company,

MANUFACTURERS OF

DYEWOOD EXTRACTS.

Sole Agents for the United States and Canada for
ACTIEN-GESELLSCHAFT FUR ANILIN-FABRIKATION, BERLIN.
Specialties for Wool, Silk and Cotton.

BENZO PURPURINE B, 4B, 6B; BRILLIANT PURPURINE R; BRILLIANT CONGO R, etc.
CHROME FAST BLACK B, a new fast black for wool.

NEW YORK: 55 BEEKMAN ST. PHILADELPHIA: 124 ARCH ST.
BOSTON: 117 HIGH ST. HAMILTON, ONTARIO.

Established 1834. H. G. JOHNSON, Proprietor.

Wm. G. Johnson Co.

Manufacturers of

DYEWOODS

Logwood Extracts, - - -
Ground and Bolted Camwoods
And other Fancy Woods. -

All Goods Warranted Uniform.

Long Distance Telephone. UNCASVILLE, CONN.

JOHN J. KELLER & CO.,

104 and 106 MURRAY STREET,
NEW YORK.

220 Church St., Philadelphia. 135 Pearl St., Boston.

Aniline Colors,
Dyewood Extracts,
Sumac and
Nutgall Extracts.

FAST COLORS for wool dyeing, one dip cotton colors, novelties and specialties for calico printing.

—— MANUFACTURED BY ——

JOHN R. GEIGY & CO., Basle, Switzerland.

WM. J. MATHESON & CO., Ltd.

IMPORTERS AND
MANUFACTURERS OF

DYE STUFFS

New York,
Boston,
Philadelphia,
Providence,
Charlotte, N.C.,
Montreal, Canada.

FARBENFABRIKEN OF ELBERFELD CO.

77 William Street, New York. *68 Batterymarch St., Boston.*
11 North Front Street, Phila. *189 Kinzie Street, Chicago.*

Alizarine Black-Bayer

(DIAMOND BLACK.)

The Cheapest Fast Black for Wool.

C. BISCHOFF & CO.,

87 and 89 Park Place, New York. Branches, 139 S. Front St., Phila. 104 Broad St., Boston.

Aniline and Alizarine Colors, Dyestuffs, Chemicals,

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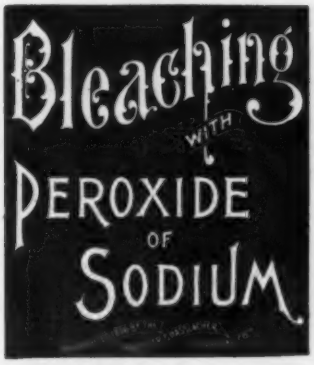

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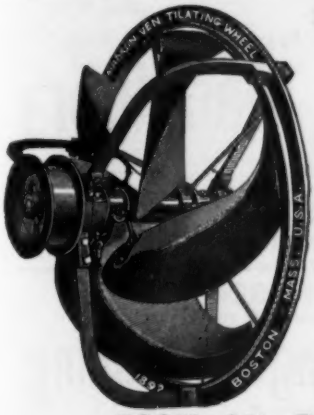

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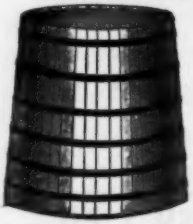

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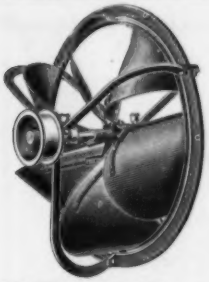

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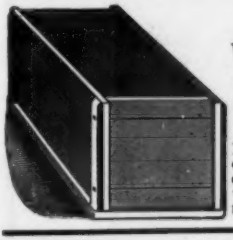

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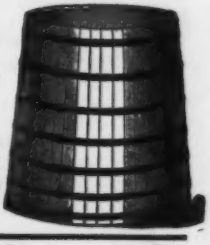

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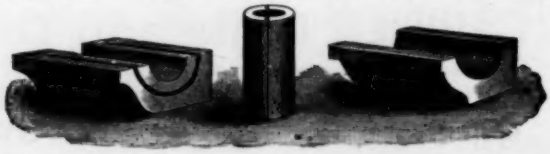

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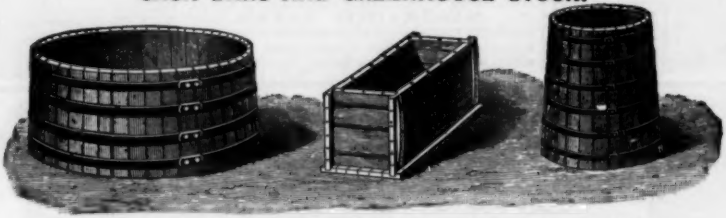

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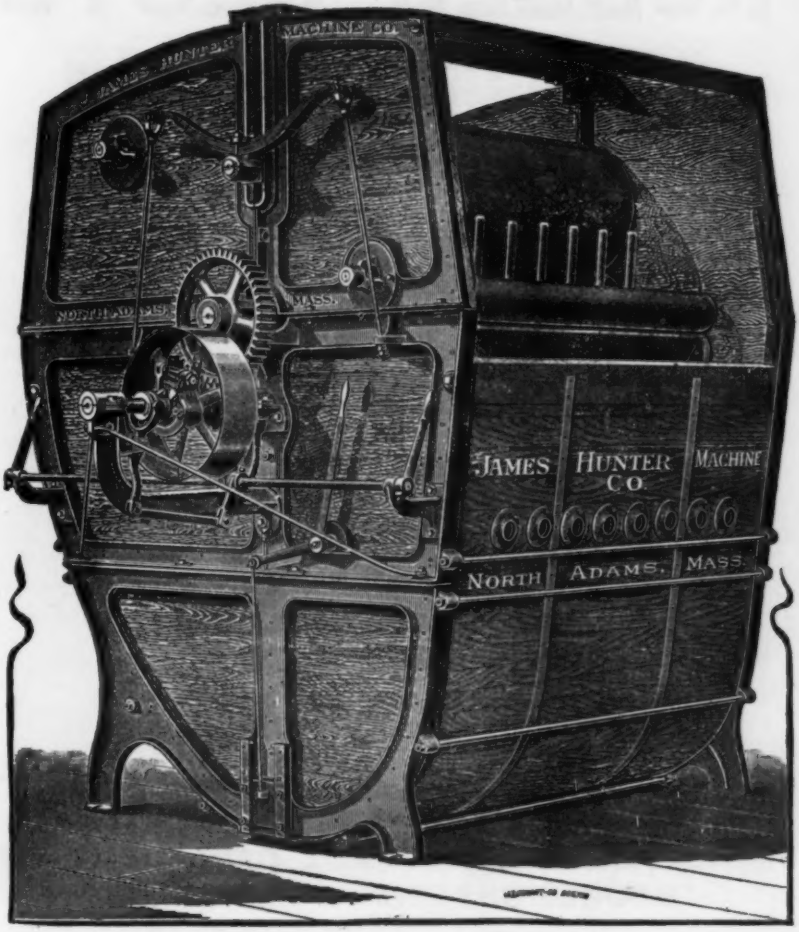

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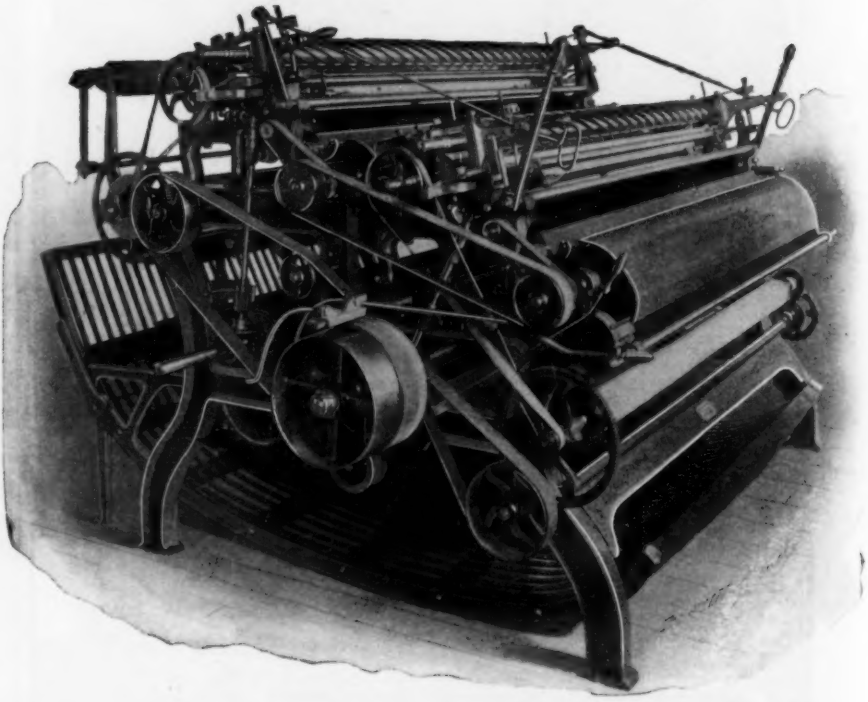

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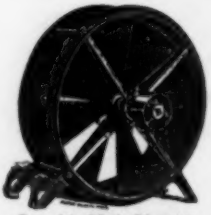

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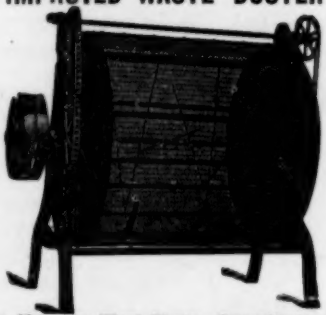

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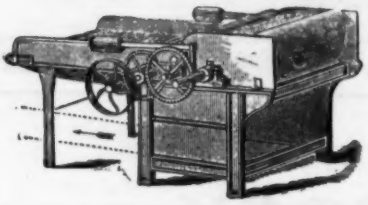

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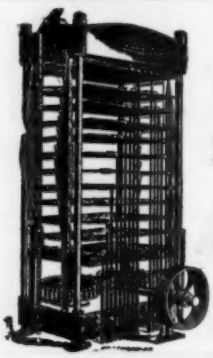

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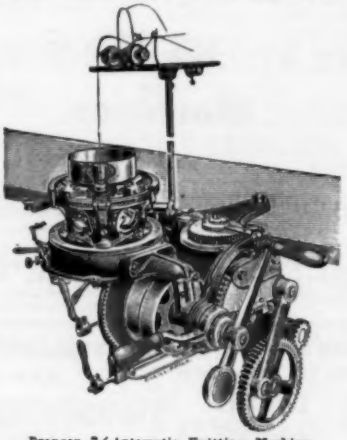

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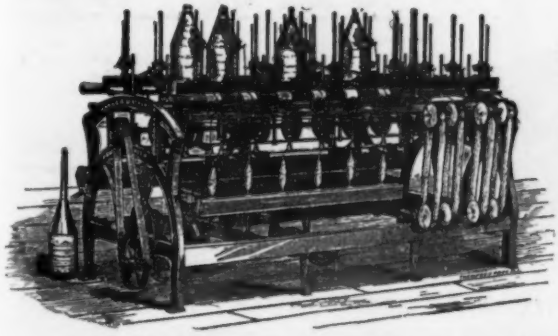

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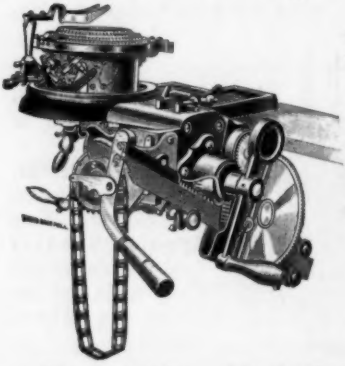

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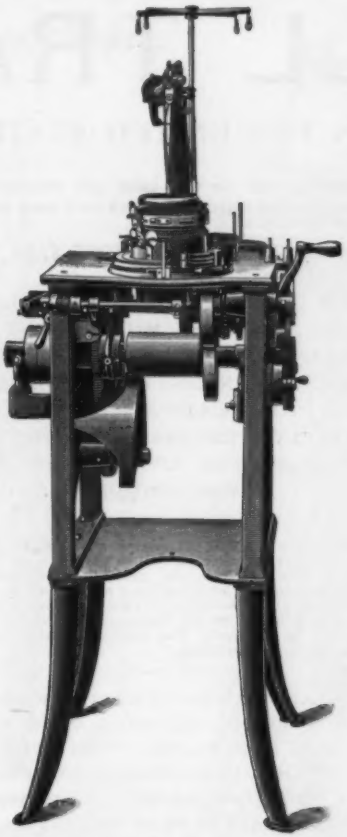

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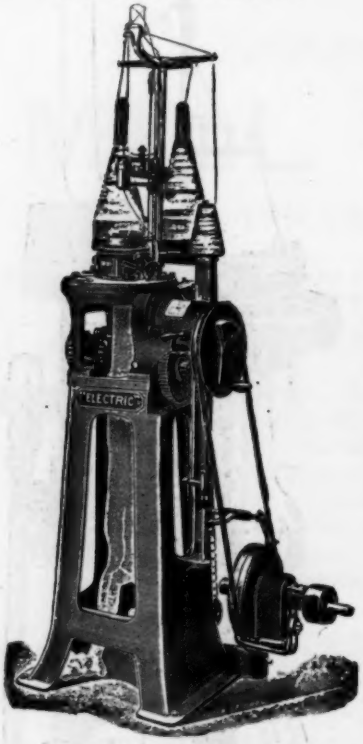

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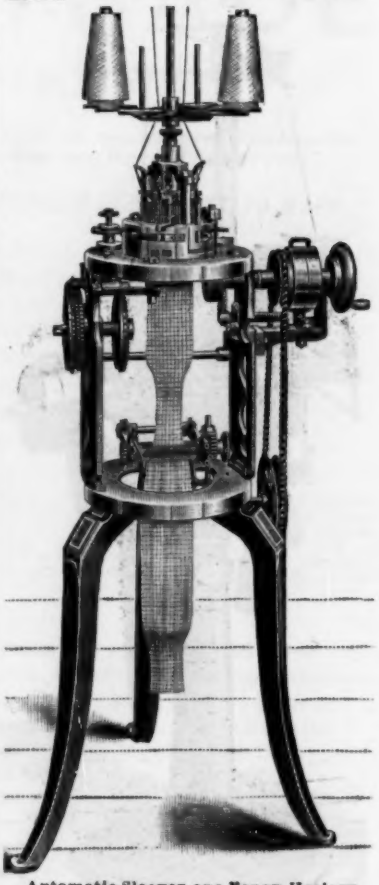

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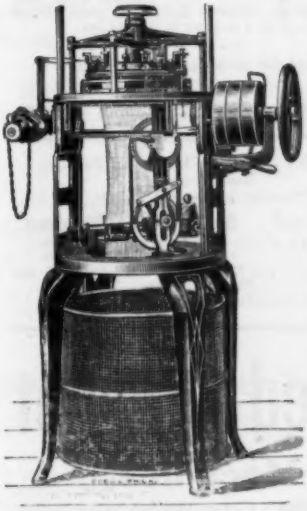

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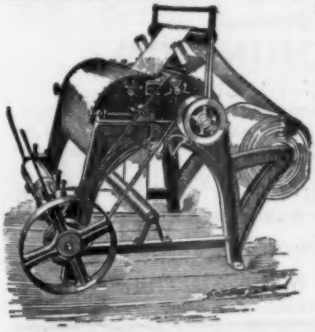

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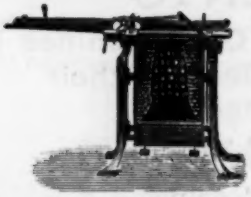

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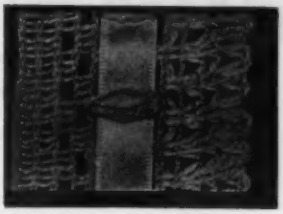

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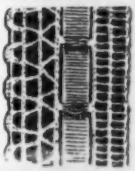

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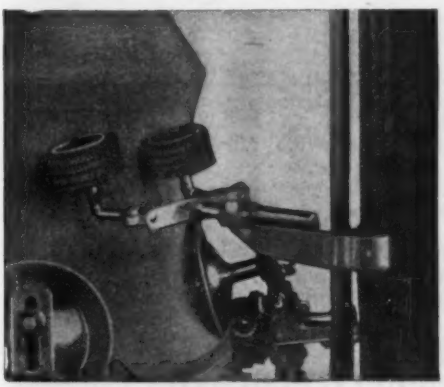

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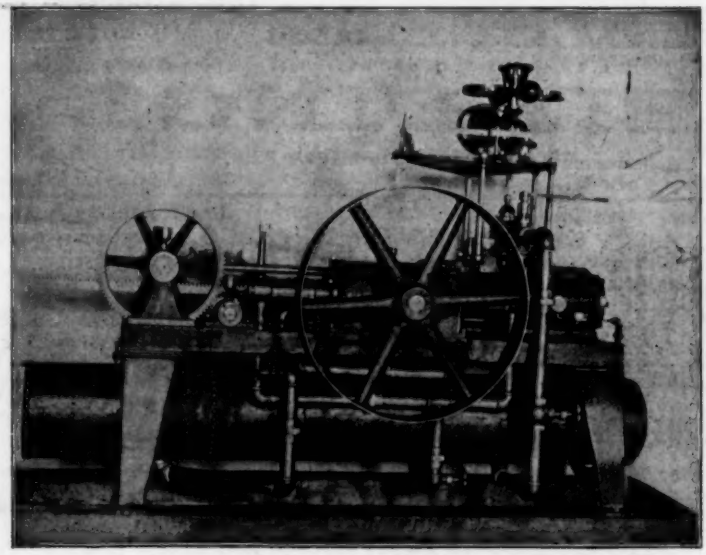

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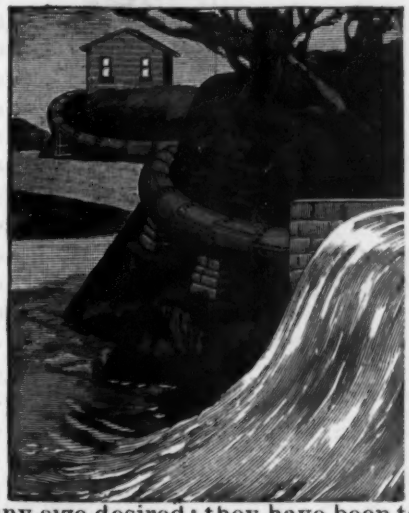

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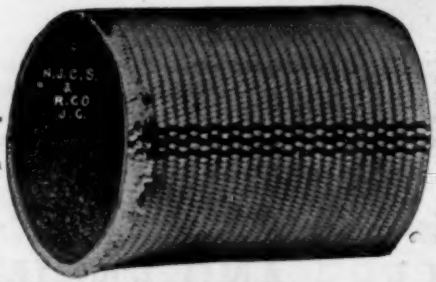

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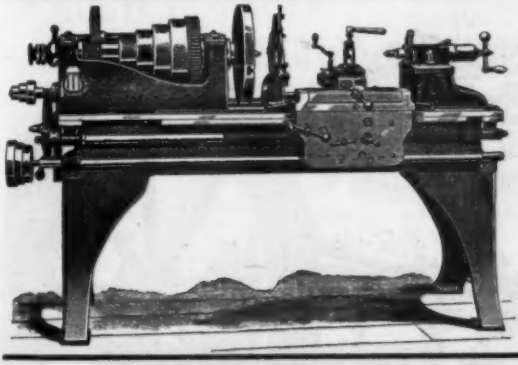

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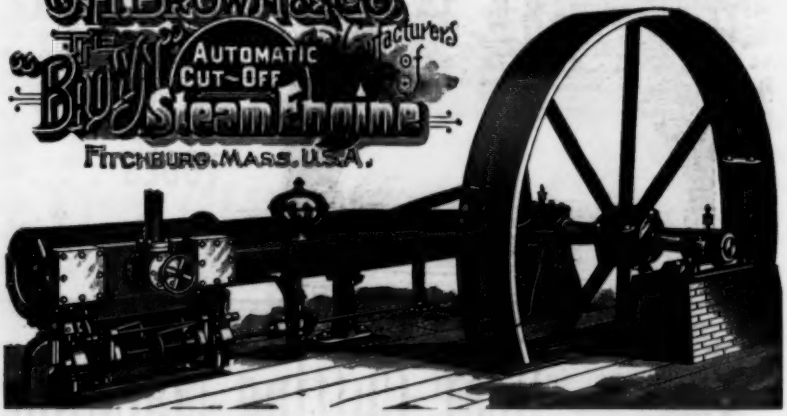

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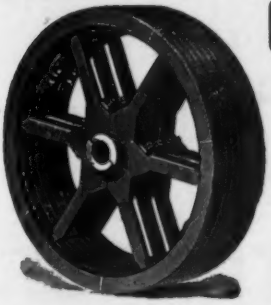

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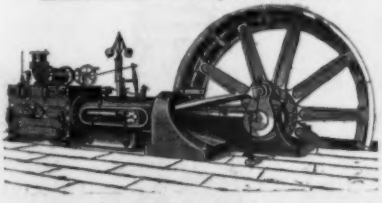

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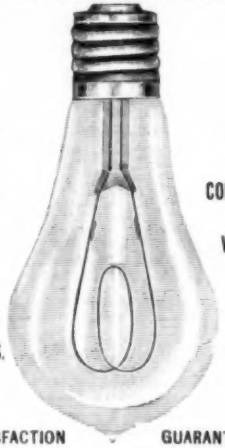

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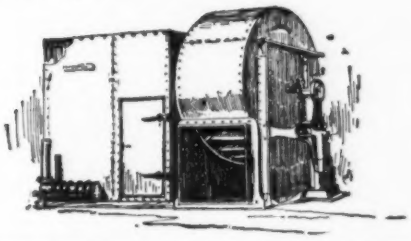

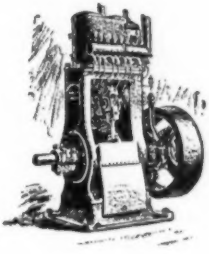

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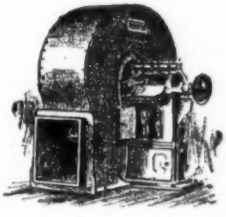

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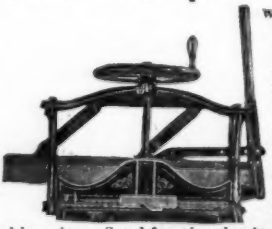
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